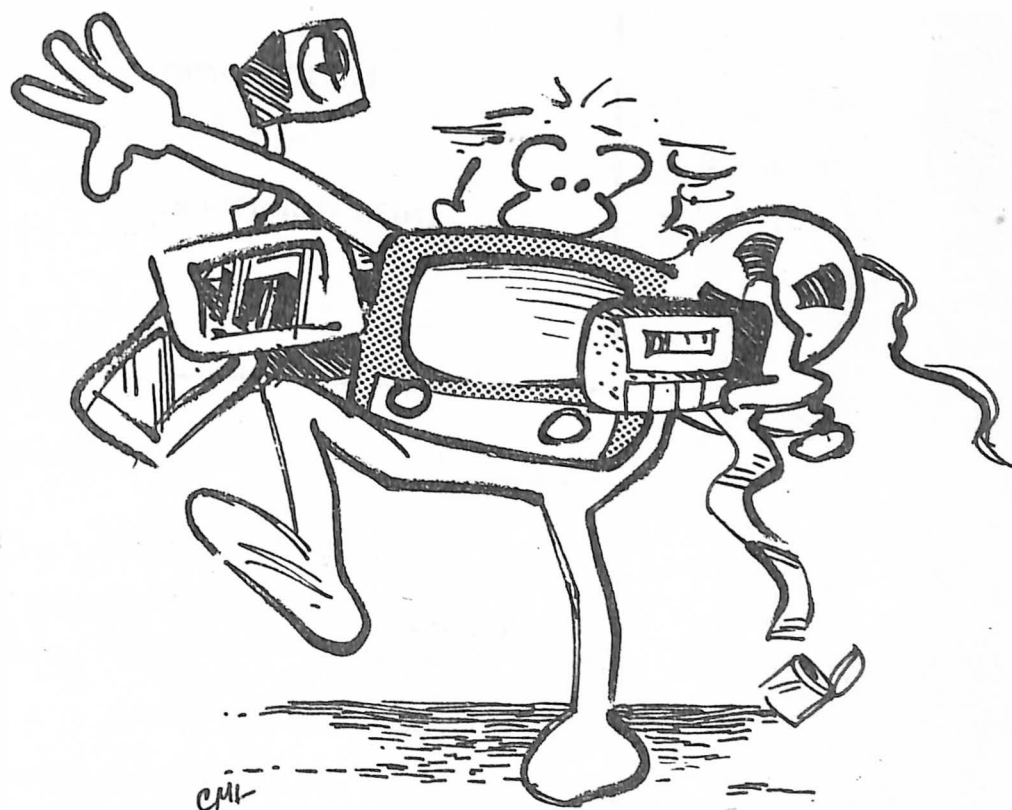


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INTRODUCTION TO

INSTRUCTIONAL  
MEDIA



MEDIA

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# **LST 547**

INTRODUCTION  
TO  
INSTRUCTIONAL MEDIA

BROUGHT TO YOU BY:  
Library Science/Educational  
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School of Education  
University of North Carolina  
at Greensboro

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## INTRODUCTION

### Course Objectives:

At the termination of the course you should be able to:

1. Correctly operate each of the following pieces of equipment, selecting the appropriate software to use with the equipment, and threading and operating the equipment in a reasonable amount of time.
  - a. 16mm motion picture projector (both autothread and manual thread)
  - b. 2x2/filmstrip projector
  - c. 2x2/Carousel projector
  - d. Opaque projector
  - e. Overhead projector
  - f. Phonograph
  - g. Tape recorder (recording both live recordings and disc recordings reel to reel and cassette)
  - h. Film splicer
  - i. Tape splicer
  - j. Technicolor super 8mm projector
  - k. Filmstrip viewers (with cassette and disc sound capability).
2. The student should be able to construct in writing a model of communication, labelling each part correctly.
3. Describe in writing at least three areas in a model of communication where communication can break down, and give an example of each type of breakdown.
4. Apply a minimum of six general considerations used in the evaluation of any media software to simulated instructional problems.
5. List at least four advantages and four disadvantages of each type of media. (Used in item #1. Do not include h or i.)
6. List at least five sources of Educational Media Hardware and/or Software catalogs.
7. List at least three major media periodicals.
8. List at least two national media organizations.
9. Using the systems approach, the student will be able to graphically illustrate an instructional design procedure, including all of the major components.
10. The student will correctly write behavioral objectives stating the desired behavior (in behavioral terms), the conditions of behavior and the criteria for acceptable performance with at least one from the cognitive domain, one from the affective domain, and one from the psychomotor domain.

11. Using a dry mounting press, a tacking iron and materials supplied by the instructor (MT5), the student will dry mount an illustration onto a piece of poster board. The print must completely adhere to the surface when the board is flexed according to some form of balance, with no bubbles or excess tissue showing. On the back of the poster board, the student will correctly state at least one behavioral objective for using this project.
12. The student will cover the dry mounting produced in Objective #11 with a seal-lamin covering making sure that air bubbles are eliminated.
13. Using rubber cement the student will permanently mount an illustration onto a piece of poster board, maintaining equivalent margins with complete adhesion. On the back of the poster board the student will correctly state at least one behavioral objective for using this project.
14. Using an Ektagraphic Visual maker Kit, the student will produce three slides, at least one from a large copy stand (maximum illustration size of 8x8 inches), all representing a common theme. Ask the instructor about framing procedure prior to taking the slides.
15. Given a 3M original and transparency film, develop a transparency using a thermofax machine.
16. Given the necessary materials you will design and create a master from which either a spirit master or overhead transparency or both could be made.
17. Given the necessary materials you will design a color transparency using at least two colors. It must project clearly with solid lines and no extraneous marking apparent.
18. Using a combination of the materials and techniques from Objectives 15, 16, and 17 design a transparency incorporating at least one overlay, but no more than four overlays, with color. State a performance objective for this set of transparencies.
19. Given seal-lamin and clear contact paper the learner will make two color lift transparencies from clay based magazine pictures. These transparencies must project clearly, be properly mounted and have all clay residue removed.
20. The student will place the material to be projected in an opaque projector and copy or trace on a piece of 15x20" paper either an enlargement or a reduction of the original material (or parts thereof) so as to fill the specified dimensions.
21. Using a slide of your own choosing, or a suitable frame from a filmstrip, make at least one enlargement of the image or parts thereof, filling a paper 7x10" by tracing over the projected image.
22. Given the materials of his choice the student will design and create a multimedia kit consisting of at least three types of media. An objective must accompany this project.

23. Given a 10 minute, 16mm film, on splicing techniques, a length of 16mm film, and splicing materials, the learner will demonstrate three splicing techniques to the instructor's satisfaction. The three techniques are:  
1) Glue, 2) Kodak Tapes, and 3) Scotch tape (make-shift).
24. The student will apply the skills and information obtained from accomplishing the first 23 objectives to design, produce, and present a 5-10 minute mediated instructional lesson or instructional module.
25. The student will demonstrate knowledge of these objectives by completing an exam to his/her desired performance level (see grade contract). Failure to accomplish that level will necessitate completion of another version of the final exam to that specified level.

## Instructional Modes Seminars

A variety of instructional modes are employed in this course:

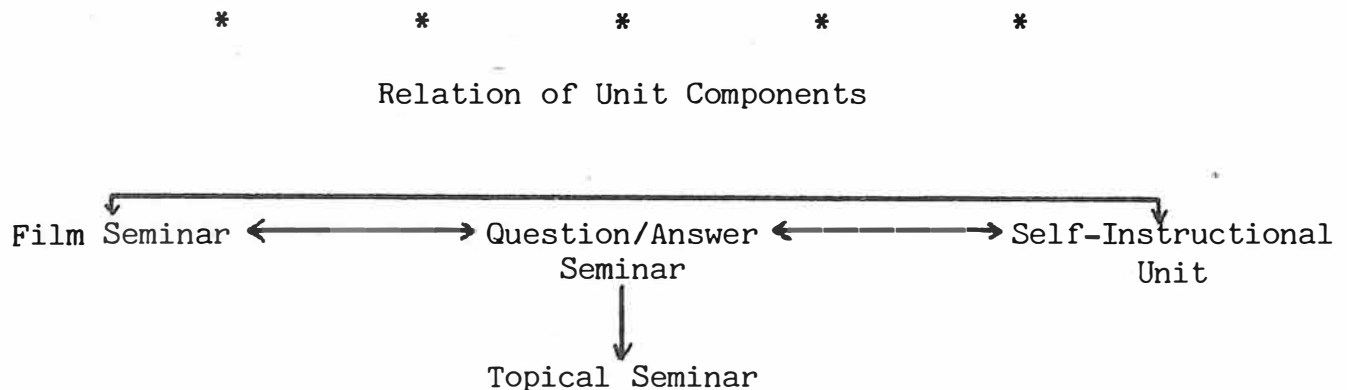
### Seminars:

Three types of seminars will be scheduled during each semester this course is offered. Attendance is optional, though strongly suggested for supplementary content and providing feedback, especially if you are experiencing difficulty with the course. The schedule of these seminars will be distributed during the first class session.

Film Seminars. At various time periods throughout the week (day and evening) film seminars will occur. These consist of content films related to the course instruction. These films represent primary instructional resources for the course. They are included in the task sequence for each of the units of instruction. At the seminar, a written introduction for each of the films will be distributed. Because of the high cost of film purchase and rental, these films will have to be viewed at specific times throughout the semester. This is a regrettable limitation to the self-instructional design of the course.

Question-Answer Seminars. During various scheduled time periods throughout each week, the instructor will be available in a seminar room for individual or small group consultation. These sessions will be open-ended, i.e., to discuss any topic of concern to the student related to content application, procedure, etc. These seminars are intended to answer questions, provide tutorial assistance, deliver or receive feedback. Attendance should be predicated on a question or problem.

Topical Seminars. A schedule of topical seminars related to course content will be conducted by the instructor throughout each semester. These seminars will deal with issues related to using media, innovation with media, change, copyright, new production techniques, evaluation procedures, etc. Attendance is optional. Those students interested in pursuing knowledge about media beyond the rudimentary performances required by the course are encouraged to attend.



These seminars are designed to interact with the other course components, viz. the self instruction units. Their purpose is to supplement the self-instruction unit in addition to relating it to classroom use and providing some interactive context for understanding the processes introduced. One of the most frequent complaints registered about self-instructional courses is the lack of rapport or interpersonal interaction available. These seminars address this need. Use them to derive the greatest benefit from the course.

## Self-Instruction Lab:

The self-instruction lab is open on a regularly scheduled basis throughout the academic year. It is available for practice and competency-testing on all of the required audiovisual equipment. In addition, graphics production equipment is available to enable you to produce all of the materials required by the course. Photo-essays are posted at the appropriate stations to guide you through the production or equipment operation procedures. Equipment is also available for previewing filmstrips and filmloops that provide basic instruction in these processes. During all scheduled open hours, a graduate student is available for providing assistance and testing you on the equipment.

## SELF INSTRUCTION UNITS

Each self-instruction unit included in this text includes:

- Instructional Objectives
- Task Sequence
- Self-Evaluation

Many or most include:

- Characteristics of Medium
- Advantages/Disadvantages
- Instructional Applications
- Principles of Utilization
- Learning Activity Assignment

## Instructional Objectives:



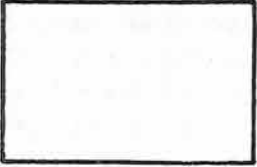
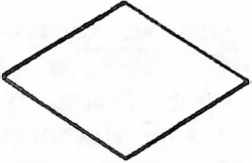

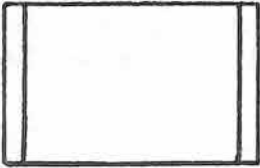
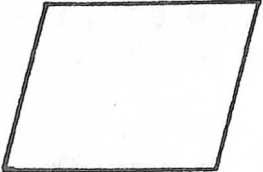
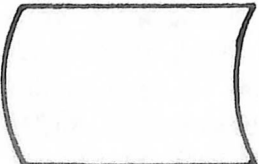
The instructional objectives are statements of instructional intent, specifying your capabilities and knowledge level at the conclusion of the unit. These are stated in terms of the behavior that you should be able to demonstrate to indicate the capabilities and knowledge (see unit on Behavioral Objectives).

## Task Sequence:

Each unit includes a Task Sequence, which is just that: a sequence of tasks or activities that, when completed, will enable you to accomplish the objectives stated at the beginning of the unit. It's as simple as that, except. . . .

The task sequence is stated in terms of a flow chart or flow diagram. Flow charts grew out of computer technology as a means for visualizing the flow of processes and routines in a computer program. In this course and text, they will be used to visualize (more unambiguously than verbal instructions) your movement and progression through the course. The flow charts used in the Task Sequences delineate the processes, the decisions, and resources to be used in completing the course activities. A listing of flow chart symbols and their meaning is presented on the next page.

# FLOW DIAGRAM SYMBOLS

<u>Symbol</u>	<u>Name</u>	<u>Function</u>
	Arrow	"Go this way"
	Terminal	"Begin here" or "End here"
	Operation	"Do this"
	Decision	"Make a choice"
	Connector	"Go to another connector bearing the same letter"
	Specific Reference	"Use the resource listed in the manner described in the process box next to it"
	Output	"Produce or make this thing: describes a product to be submitted for evaluation"
	Memory	"Remember this for the test"



The primary concern of flow charts is direction. The direction controls the sequence in which you complete items and is often a function of some of the components it connects. Therefore it is appropriate to begin with the directional sign, the . . .

Arrow. The arrow leads you from one symbol to another and tells you in which direction you should go, i.e., what you should do next. All the other symbols have arrows leading to and/or from them. (If they didn't, you would get "stuck inside" a flow diagram and never complete the operation.) The arrow and line direct the flow or sequence of tasks to be completed.

Terminal. The terminal symbol is used to get you started and end you up. It's only function is to get you into or out of a flow diagram. Otherwise, you would never know where to begin or end.

Operation. The discrete steps in the operating procedure are enclosed in the operation symbol. This symbol simply tells you to perform a certain act and that's that. The operation symbol makes up the bulk of the flow diagram.

Decision. Sometimes it will be necessary to make a choice in the operating procedure. When that point is reached, the decision symbol will be used to enclose an abbreviated question. The possible choices are given and you will proceed to the next appropriate operation based upon your choice. For this reason, directional arrows extend from two or more corners of the decision symbol.

Connector. The connector is simply a way of getting you from one point to another without the use of an arrow. All connectors contain a capital letter. When you get to one in a flow diagram, stop where you are, find another connector housing the same capital letter (there will be only one), and proceed from that point. Connectors are used in two ways. First, it can put you into another flow diagram or another part of the same flow diagram when a procedure is to be repeated, without having the same steps repeated on paper (a boon to the flow diagram artist!). More often, though, the connector is used to continue the same flow diagram to another unit on the next page. Ideally, a flow diagram would be represented on a single page, but that wasn't always feasible for this manual. Either the print would have been too small or the pages too large.

Specific Reference. The specific reference symbol tells you to go to another place and do the procedure or consult the materials described there. The reference normally is for instructional materials that you are to preview (watch, listen to, etc.) or otherwise respond to. These references will help you to select the right material from the unit package at the right time.

Output. The output describes the product that should result from a particular unit of instruction. These are assignments which must be submitted to the instructor for evaluation. They represent basic media product competencies that you will need to apply toward the final presentation and to any future work in media.

Memory. In addition to a practicum, this course will include a final exam, which consists of objective questions concerning production and utilization procedures. At the completion of each unit, you will in effect need to hold in memory the knowledge and information gained in that unit to be applied to the final during the evaluation phase. Try not to memorize facts only, rather concepts, principles and procedures are all integral and therefore testable kinds of knowledge to be gained from this course.

## Course Organization:

The course is organized into four phases (Figure 1; described in more detail in Figures 2 - 5). Using the information presented in the previous section on Task Sequences, trace the sequence of your instructional activities in this course.

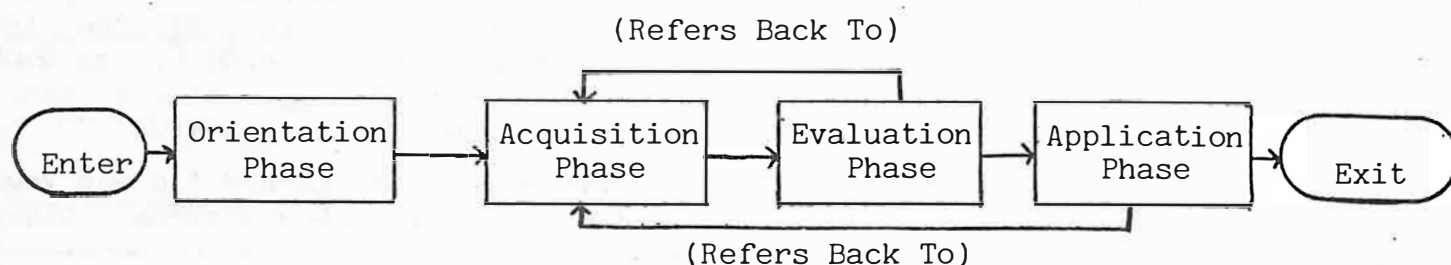


Figure 1. Course Organization

Orientation Phase. This phase consists of the general course orientation, suggestions on the conduct of a self-instructional course, description of the techniques (e.g., flow charting, self-scheduling), an introduction to instructional media and technology, communications theory, and the construction of behavioral objectives and the systems approach. It basically sets the stage for the acquisition of knowledge regarding production and utilization. These units develop a context for subsequent course work. The curricular and theoretical position of instructional technology is explicated, providing the basis on which further information will be accommodated. (see Figure 2)

Acquisition Phase. This second phase of the learning process contains the bulk of the course content: The production and utilization competencies related to the media. During this stage, after completion of all units in the orientation phase, you will acquire the basic media skills that will enable you to apply them later. These units, except where specified by combination, can be completed in any order that you choose. There should be no inherent advantage of any sequence. The units have been, for the most part, designed to stand alone. (see Figure 3)

Evaluation Phase. In order to prove your competence and knowledge related to the media introduced during the acquisition phase, a combination of evaluative activities have been designed, both of which may be repeated in order to achieve your pre-defined level of competence (stated in your grade contract). The first evaluation comprises a traditional objective-type (multiple choice, fill-in, true-false, matching) instrument that will test recall and understanding of specifics, procedures, concepts, and principles related to production and utilization of media. You need to log on the computer, which will randomly select a number of questions from a large question bank. After taking the test, it will be evaluated by the instructor. If it does not meet the criterial level specified by your contract, you will need to schedule a conference with the instructor for guidance and/or specific prescriptive assignments. After completing and showing evidence of additional work, you will be allowed to reschedule another test. (see Figure 4)

The second evaluative technique is the Practicum, which presents hypothetical selection and evaluation problems that you must solve. Given descriptions of learners and instructional settings you will have to select media from a list of hypothetical or real choices, justifying your answer with logic and knowledge gained during the acquisition phase. This procedure may be repeated once to allow you to attempt to reach your criterion level, after a conference with the instructor. This latter evaluative technique may be accomplished at home on your own time, allowing you to use primary and secondary references.

Figure 2. ORIENTATION PHASE

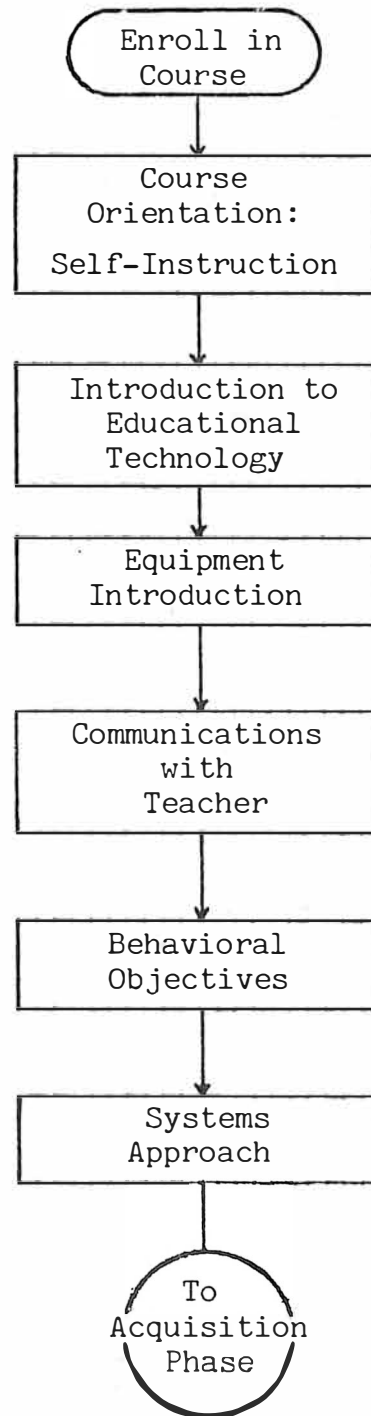
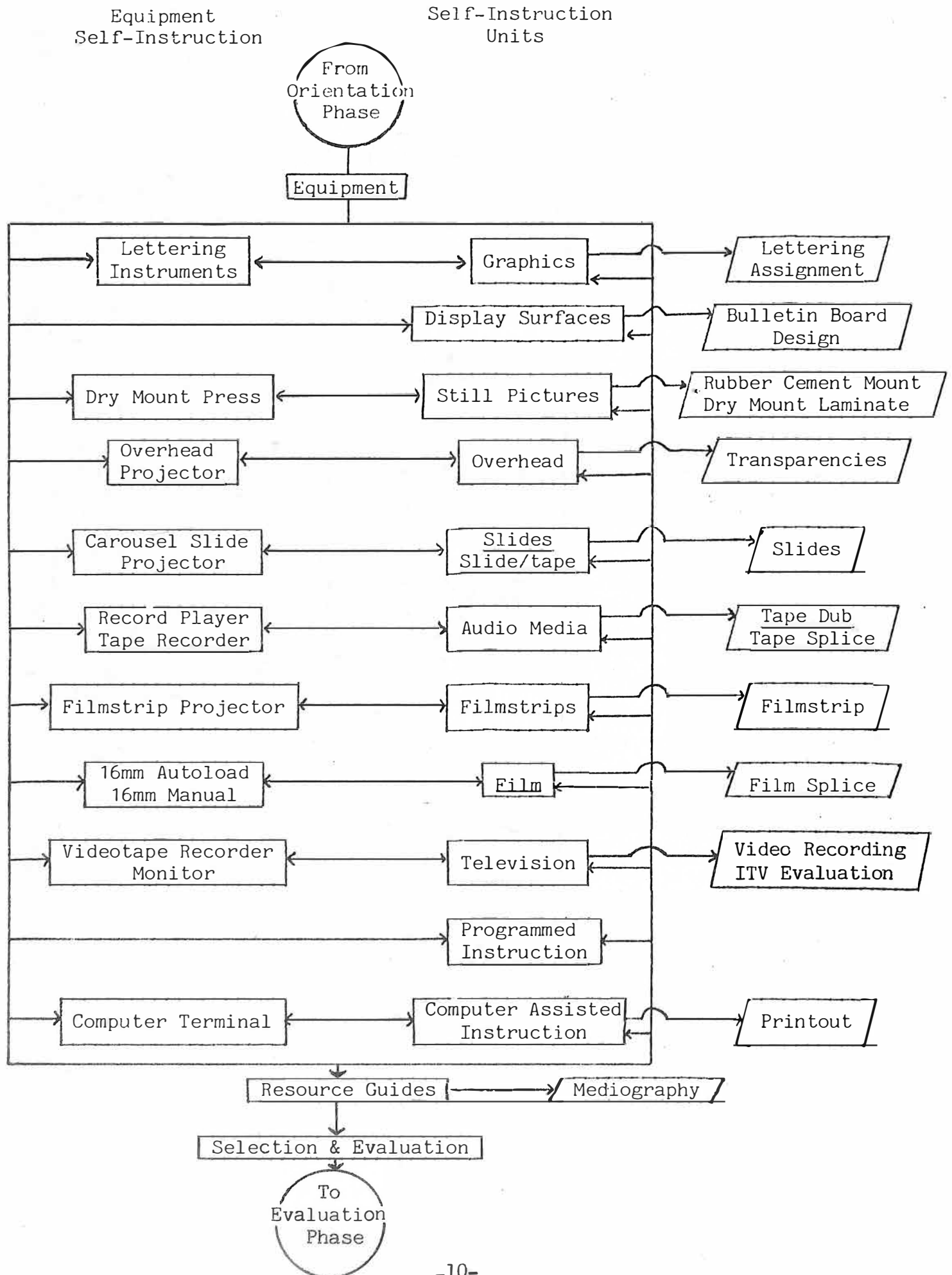


Figure 3. ACQUISITION PHASE



The results of these two exercises, along with the Learning Activities, equipment checklist and other criteria are transferred to the Decision phase (Final Project) is satisfied. (See Figure 4.)

Application Phase: During this final phase, you will apply the techniques, skills and knowledge gained in the previous three phases to the development and production of a mediated lesson or self-instructional module. This experience is intended to integrate all that you have acquired in the course into a functional teaching package. Subject matter is a matter of personal choice. The requirements for the activity are stated in the section on Final Presentation. (See Figure 5.)

Grade Decision: Since this course employs a contract, the final grade decision merely entails a verification that all criteria have been met. You should provide evidence to the instructor that you have completed all requirements of the course at the predetermined criterion level. If this is the case, you will be assigned the grade you contracted for. If you have not completed all of the requirements or if any are not at the criterion level, the instructor will assign you the task of resubmitting certain requirements. If this is not possible, your grade contract will be renegotiated at a lower level. (See Figure 6.)

\* \* \* \* \*

When you have completed all of the requirements for the contract, you will receive that grade. If you are unable to perform on your pre-specified level, you will have to recontract or obtain individual tutorial assistance. At all times, feel free to consult the instructor during scheduled hours or by appointment.

Figure 4. EVALUATION PHASE

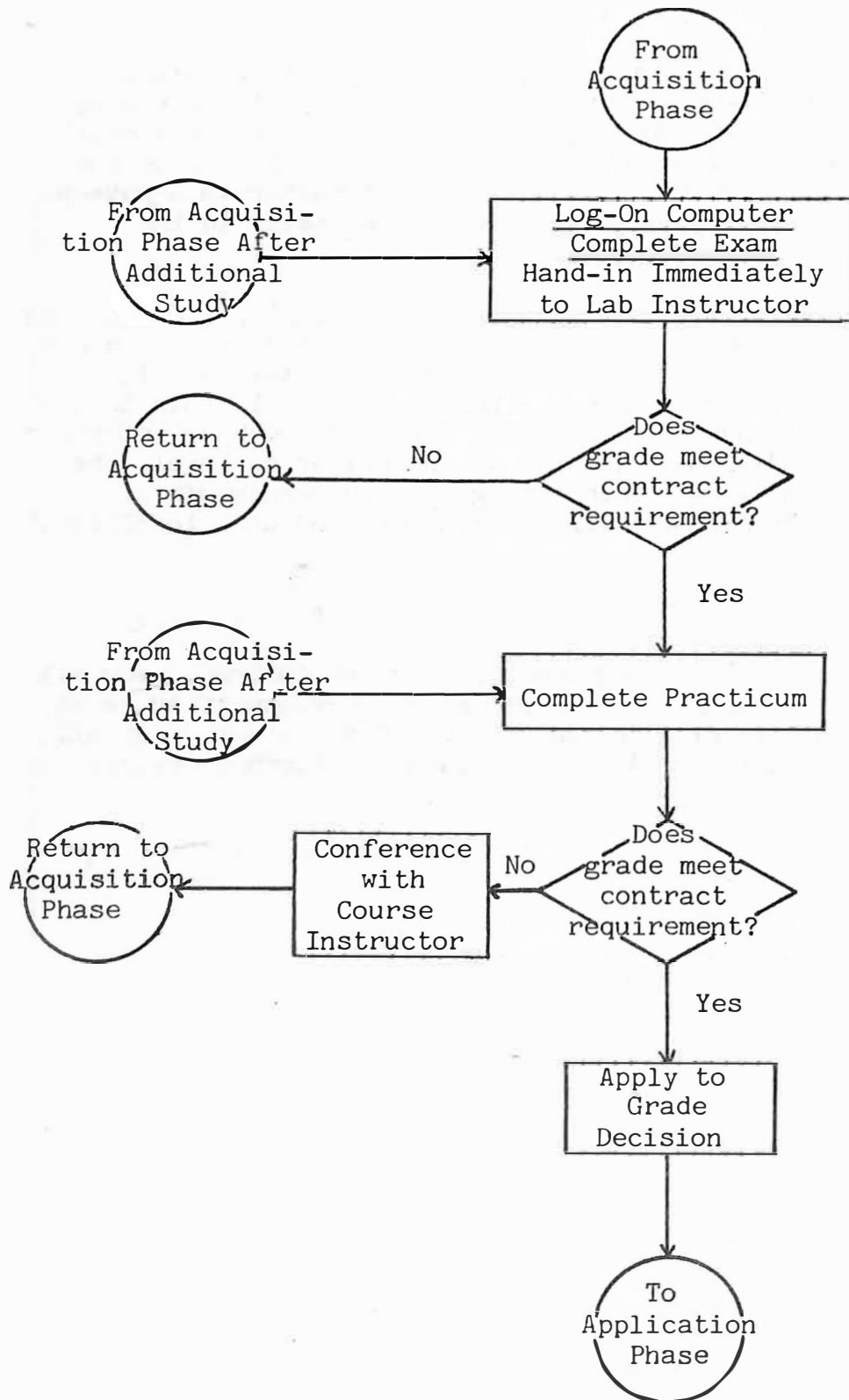


Figure 5. APPLICATION PHASE

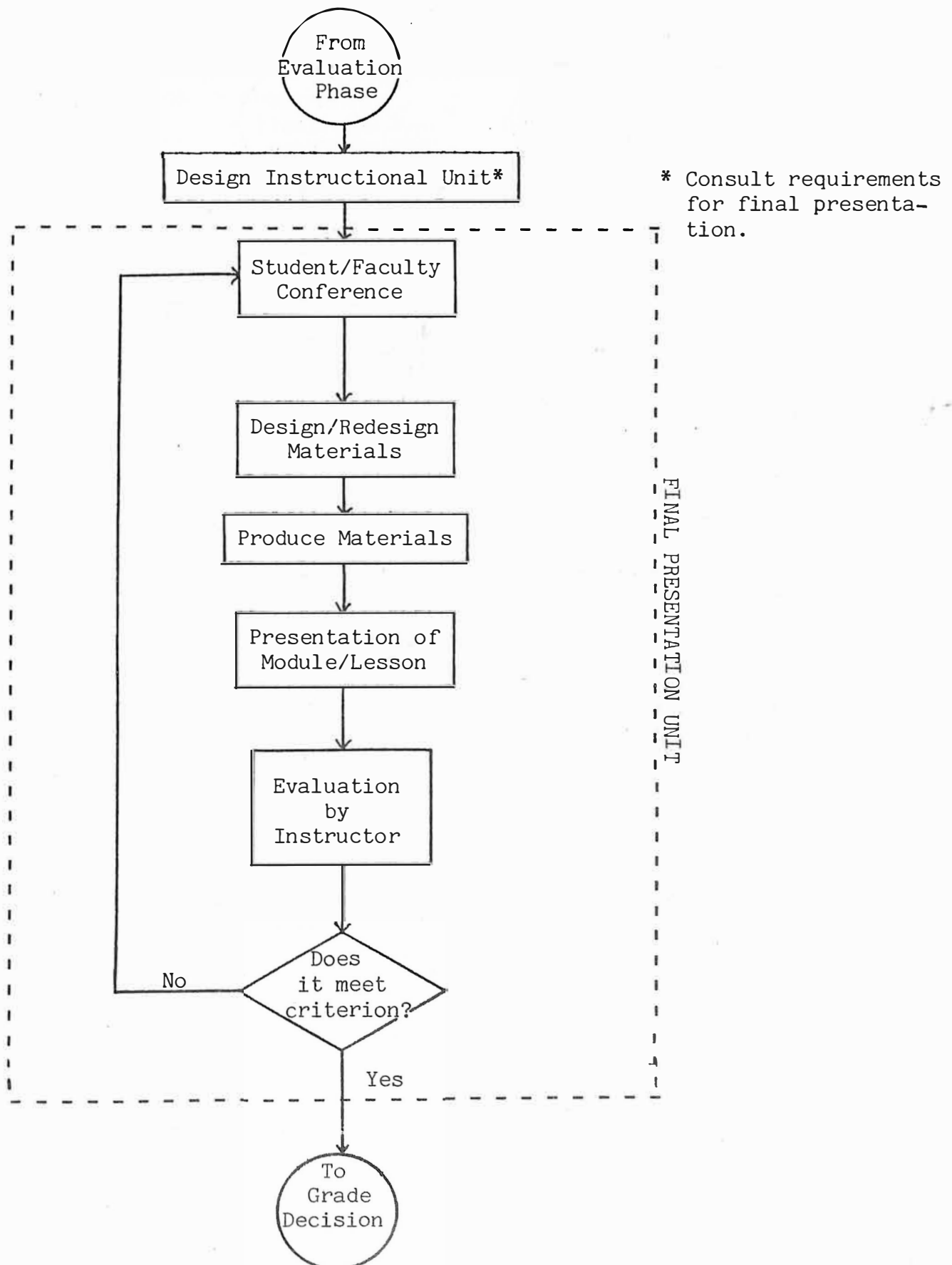
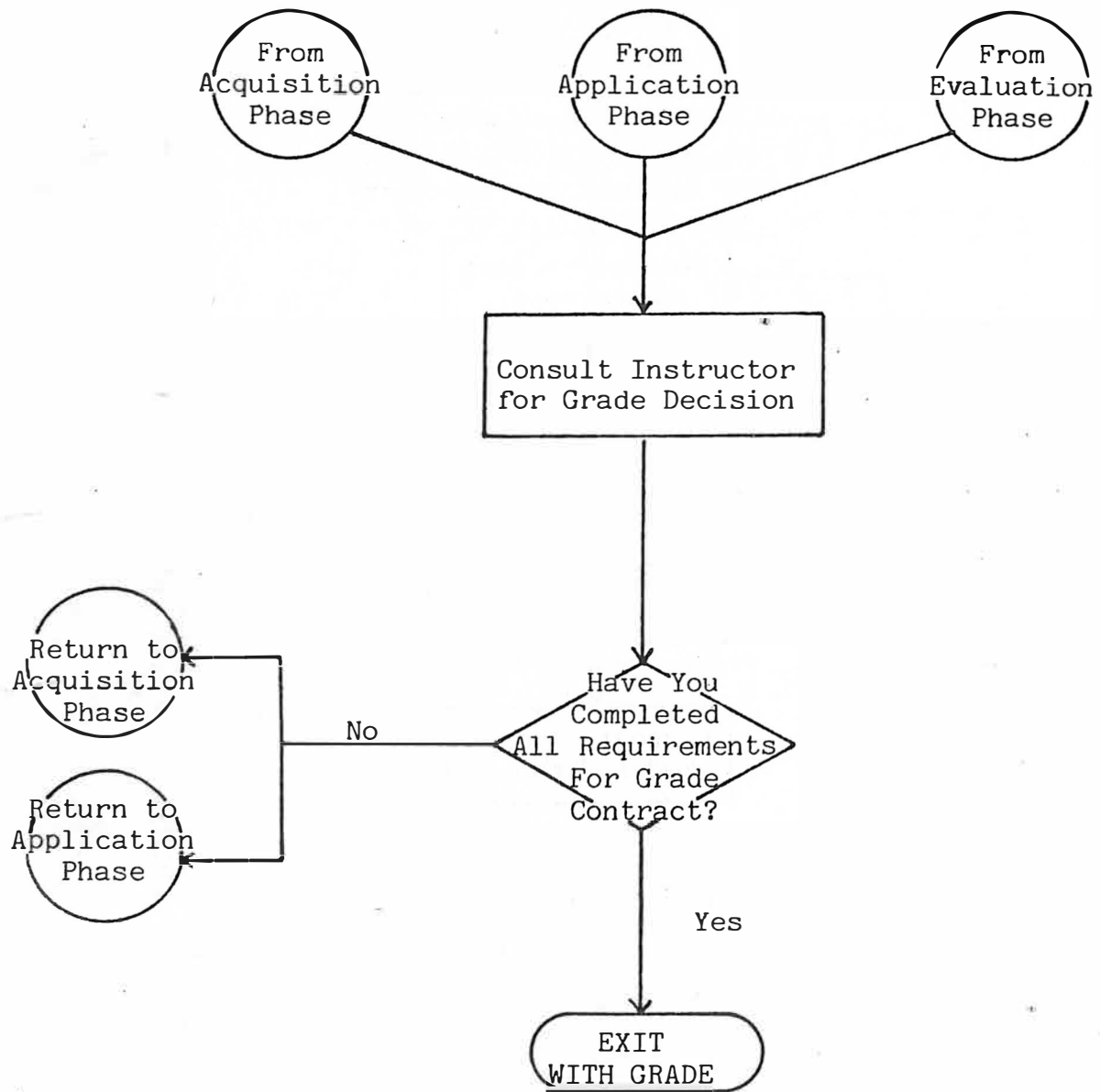


Figure 6. GRADE DECISION





Grade Contract:

For the grade of "C", you must complete:

16 Learning Activities with at least a "C" on all activities\*  
Equipment Operation Checklist completed  
Final Project (production of 2 media)  
Practicum (with a grade of at least 70%)\*\*  
Exam (average 70% or above)\*\*\*

For the grade of "B", you must complete:

16 Learning Activities with at least a "B" on all activities\*  
Equipment Operation Checklist completed  
Final Project (production of 2 media)  
Practicum (with a grade of at least 80%)\*\*  
Exam (average 80% or above)\*\*\*

For the grade of "A", you must complete:

16 Learning Activities with an "A" on all activities  
Equipment Operation Checklist completed  
Final Project (production of 3 media, one from interactive group)  
Practicum (with a grade of at least 90% - may be repeated)\*\*  
Exam (average 90% or above)\*\*\*

For the grade of "D", you must:

Complete all requirements but fail to meet criteria for "C"

For the grade of "F", you must:

Register for the course; partial completion of assignment

\* Detach each assignment sheet and submit it (stapled to the assignment) with the assignment.

\*\* Practicum may be repeated once only, after consultation with the instructor and evidence of additional study.

\*\*\* Exam may be repeated once, only after consultation with the instructor and evidence of additional study.

Secondary Resources: (See Table I)

Throughout the course units, you may be instructed to consult secondary resources consisting of a number of established texts and guides that are available on reserve in Jackson Library. When you are directed to consult these resources, it usually means that the primary sources and procedures were not effective or clear enough to enable you to pass the self-evaluation. Simply consult the table of contents or index to locate the particular medium you are interested in. These are always available and can and should be consulted whenever you would like to better understand a particular medium or process. Do not hesitate to use these references at any time. They can only enhance your understanding of the instructional media.

Table I. Secondary Resource List

- Brown, J. W. and Lewis, R. B. *Audio Visual Instructional Technology Manual for Independent Study*, 5th ed. New York: McGraw-Hill, 1977.
- Brown, J. W., Lewis, R. B., and Harclerod, E. F. *Audio Visual Instruction: Technology, Media and Methods*, 5th ed. New York: McGraw-Hill, 1977.
- Bullough, R. V. *Creating Instructional Materials*. Columbus, Ohio: Charles Merrill, 1974.
- Haney, J. R. and Ullmer, E. J. *Educational Communications and Technology: An Introduction for Teachers*. Dubuque, Iowa: William C. Brown, 1975.
- Kemp, J. E. *Planning and Producing Audiovisual Materials*, 3rd ed. New York: Thomas Crowell, 1975.
- Kinder, J. S. *Using Instructional Media*. New York: Van Nostrand, 1973.
- Mager, R. F. *Preparing Instructional Objectives*, 2nd ed. Belmont, CA: Fearon, 1974.
- Nichols, D. L. and Crow, J. A. *Instructional Technology: Basic Skills*, 2nd ed. Austin, TX: University Stores, 1974.
- Thompson, J. J. *Instructional Communications*. New York: Van Nostrand Reinhold, 1969.
- Wittich, W. A. and Schuller, G. F. *Instructional Technology: Its Nature and Use*, 5th ed. New York: Harper & Row, 1973.

### Reference to Brown & Lewis:

The only text in addition to this one is:

Brown, J. W. and Lewis, R. B. *Audio Visual Instructional Technology Manual for Independent Study*, 5th ed. New York: McGraw-Hill, 1977.

This manual is for sale in the Bookstore and also available in Jackson Library. Most production activities use this as an additional reference or resource. Consult the unit in that manual whenever it is referenced.

### Course Design Rationale:

Two aspects of this course seem to require explanation. The first relates to the programmed nature of the course. You will be proceeding at points through linear, almost invariant, sequences of learning activities. This is necessitated in part because the course is self-instructional. To preclude your experiencing frustration resulting from a lack of guidance or direction, these components are implicit in the system. At all times you know where you are and what remains to be accomplished. The rate of progress is entirely up to you.

This is an entry-level course for all students, i.e., the initial introduction to instructional media. As such it is designed to facilitate development of specific competencies, which are the foundation for further study in media. It is important in this subsequent study that certain prerequisite competencies be assumed. In these courses, you will be allowed to expand more in your own individual development. For those not continuing media studies, the competencies represent a selection of basic media skills, (an introduction, if you will), that will help you apply some media to learning problems. The competency-approach merely certifies that you will be able to do certain things upon conclusion of the course for whatever reason you are enrolled.

Related to this first aspect is the idea of evaluating your progress solely on the basis of competencies attained. The University requires the use of grades; the course is oriented by development of competencies. These two ends are reconciled by the contract system used in this course. You determine the specific competencies and the degree of proficiency you wish to attain. When you attain that level of performance, you receive that grade. If it requires more than one attempt, you are allowed to repeat aspects of the course until you do attain your pre-determined level of competence. If you are unable to

## EQUIPMENT OPERATION

Learning to operate audiovisual equipment is a necessary evil -- a means to an end. Many forms of media are used in conjunction with a piece of equipment, i.e., in order to show the software (filmstrips, films or other materials) you need to use the hardware (EQUIPMENT). It is an inevitable fact. If you want to use media, or perhaps more pertinently, if you want to pass this course -- you'll have to become competent at operating various pieces of equipment. But, don't panic. No recorded fatalities have ever resulted from media equipment. It is harmless and surprisingly easy to operate. Your worst possible fear is momentary embarrassment, or perhaps fear itself (but that's not original). Just follow the instructions provided in the self-instruction lab and PRACTICE. It's the only known remedy for "equipment-phobia."

Equipment operation, while important and necessary, does not occupy a major instructional thrust of this course. That is because it would be inappropriate. Operating equipment is fundamentally a psychomotor task (see Behavioral Objectives unit), i.e., mental coordination of physical activity. The most appropriate instructional strategy for such skills is modelling--practice--feedback. Use the photo essays, filmstrips or film loops in the self-instruction lab to show you the procedure for operating the equipment. Use the performance indicated in the photographs as a model for your behavior. Then practice those skills until you are proficient. Use the equipment or the graduate student for feedback. If the equipment works, you performed correctly (positive feedback). If the machine does not operate, check the procedures or ask the graduate student on duty why it isn't operating (corrective feedback). When you are able to operate it consistently and smoothly, sign up for the competency test. That's all there is to it, except don't PROCRASTINATE. Don't defer the equipment checklist until the final week. You will derive more from the experience if you learn to operate the proper item of equipment as you are completing the related self-instruction unit (e.g., while completing the unit on Overhead Transparencies, learn to operate the overhead projector).

Good luck, and don't forget to plug it in.

### Equipment Operation Competency Checklists and Test:

The following pages contain copies of the Equipment Operation Competency Checklists and Equipment Operation Competency Test given in the self-instruction lab.

## EQUIPMENT OPERATION COMPETENCY CHECKLISTS

### GROUP I

#### Kodak Carousel Slide Projector

Know how to:

- Insert lens
- Load slides into tray
- Seat the slide tray
- Turn on power and lamp
- Attach remote control
- Focus using focus knob
- Focus using remote control
- Increase or decrease size of image on screen without moving projector
- Advance slides one at a time with and without remote control
- Set projector on 5 sec. automatic advance
- Raise and lower projector
- Level projector
- Remove tray when a slide is caught inside projector and reset slot on tray
- Remove lens and slide tray

Question:

Where is the power cord stored?

#### 16mm Autoload Projector

Know how to:

- Place correct reels on correct spindles
- Thread the projector correctly
- Show a film with sound
- Focus the picture
- Frame the picture
- Raise and lower the projector
- Remedy a picture that is a moving blur on the screen
- Remedy garbled sound
- Remedy a picture that is in slow motion and the sound is on wrong speed
- Fast rewind

Questions:

- In what position should rear arm be in for showing and rewinding a film?
- Where is the sound drum located?

#### 16mm Manual Thread Projector

Know how to:

- Place correct reels on correct spindles
- Thread the projector correctly
- Show a film with sound
- Focus the picture
- Frame the picture

Raise and lower the projector  
Remedy a picture that is a moving blur on the screen  
Remedy garbled sound  
Remedy a picture that is in slow motion and sound is on wrong speed  
Fast rewind

Questions:

In what position should the rear arm be in for showing and rewinding a film?  
Where is the sound drum located?

GROUP II

Viewlex Filmstrip Viewer

Know how to:

Wind the filmstrip correctly  
Thread the filmstrip  
Turn on the lamp  
Frame the picture  
Advance the filmstrip  
Remove the filmstrip

Singer Graflex Audio Study-Mate Filmstrip Viewer with Cassette Sound

Know how to:

Wind filmstrip correctly  
Thread filmstrip  
Turn on the power to the cassette and the lamp for the screen  
Frame picture  
Insert cassette  
Play cassette  
Advance filmstrip manually  
Advance filmstrip automatically  
Adjust volume  
Rewind and fast forward  
Locate the earphone jack  
Remove the cassette and filmstrip

Questions:

Do the rewind and fast forward buttons operate both cassette and filmstrip?  
What determines whether the filmstrip will advance automatically or manually?

Dukane Filmstrip Viewer with Disk

Know how to:

Wind filmstrip correctly  
Thread filmstrip  
Turn on lamp  
Loosen needle arm from holder  
Adjust volume  
Frame the picture

- Focus the picture
- Plug in the remote control
- Advance the filmstrip using the remote control
- Locate the manual/automatic advance switch
- Use hold/play lever
- Locate the earphone jack
- Remove filmstrip from viewer

Question:

Since the filmstrip holder is in the form of a cup, how should the filmstrip be wound?

GROUP III

Standard Filmstrip Projector

Know how to:

- Insert filmstrip carrier
- Locate power and fan switches
- Load filmstrip
- Focus
- Frame
- Raise and lower projector
- Insert slide carrier and slide correctly
- Change slides

GROUP IV

Rheem Reel to Reel Tape Recorder

Know how to:

- Play a pre-recorded tape
- Use volume and tone controls
- Record
- Use level indicator
- Rewind and fast forward
- Use tape counter
- Use pause control
- Use recorder as a P.A. system
- Eliminate feedback
- Erase a tape

Questions:

In what position is the monitor/normal switch when recording with a mic?  
How would you record a speech and use the P.A. at the same time?

Panasonic Cassette Recorder

Know how to:

- Play a pre-recorded cassette
- Record with the built-in and external microphones
- Use recorder on batteries or on AC

Locate and use volume control  
Use rewind and fast forward  
Erase a cassette.

Questions:

Where is the built-in condenser microphone?  
Where is the speaker?  
Where would batteries be inserted?  
Does the remote control microphone operate in all four modes?

Audiotronics Cassette Recorder

Know how to:

Play a pre-recorded cassette  
Record  
Use volume and tone controls  
Use level indicator and tape counter  
Use rewind and fast forward  
Use recorder as P.A. system  
Eliminate feedback  
Erase a cassette

Questions:

Of what use is the monitor switch?  
What is ALC?  
Why is the volume control pulled up when using the P.A. system?

GROUP V

Overhead Projector

Know how to:

Load projection stage  
Locate power switch  
Focus  
Raise and lower projector  
Locate lamp access door

Questions:

Is there a separate fan switch?  
How far (approx.) must the projector be from the screen to focus?

Technicolor 8mm Cartridge Loop Film Projector

Know how to:

Insert cartridge  
Start projector  
Focus and frame projector  
Raise and lower projector  
Use still frame button if present  
Remove cartridge from projector

Question:

What is the sequence of events for removing the cartridge?



## Newcomb Record Player .

Know how to:

- Turn on amplifier and turntable
- Plug in speaker
- Select correct turntable speed and correct needle
- Use volume and tone controls
- Locate neutral position on the speed control
- Use record player as a P.A. system

Questions:

- Which controls are necessary for the use of the P.A. system?
- Does the speaker need to be attached to use the P.A. system?

## Equipment Operation Competency

### Type of Instruction

1. The equipment lab in Room 18 is self-instructional. Each carrel contains a set of operating instructions in the form of a photo essay, and some carrels also contain instructional filmstrips and 8mm film loops. It would be wise to make the Viewlex Filmstrip Viewer and the 8mm Film Loop Projector two of the first pieces of equipment you plan to master. You can use these pieces to help you learn to operate some of the other equipment. Equipment to be used for viewing instructional material is clearly labeled INSTRUCTION. Please do not use this material to practice threading.
2. A videotape demonstrating equipment skills is also available. If this tape is not shown to your class, you may wish to see the graduate assistant about scheduling a viewing date.

### How Much Time?

From past experience, we can say that you should expect to spend about 10 hours mastering the equipment. There are 15 machines to learn, so give yourself plenty of time and don't wait until the last minute.

### LS/ET Majors

In addition to demonstrating practical skills you will need to take a multiple choice written exam. To prepare yourself for this, study the Stanton Oates Self Instruction Manual: Audiovisual Equipment, third ed. Copies are available in the book store and in the equipment lab. You must score at least 90 percent on the test. Should you score less than 90 percent, you will be expected to wait at least one day before you retake the test. You may take the test as many times as you need to. Most questions are based on practical experience.

### Testing

1. A graduate assistant will administer formal testing to complete the practical phase of the equipment operation competency requirement. Of the 15 pieces of equipment there are seven pieces which you will demonstrate your ability to operate. These 15 pieces are divided into categories. You may wish to be tested on only one group at a time or you may demonstrate all seven at once.
2. Each student will operate the Kodak Carousel Slide Projector, the 16mm Bell & Howell Autoload Movie Projector, and the 16mm Bell & Howell Manual Movie Projector, and one piece from each of the following groups:
  - A. Audio equipment (reel-to-reel tape recorders and cassette recorder).
  - B. Filmstrip viewers (Singer-Graflex, Dukane, and Viewlex).
  - C. Filmstrip projectors (Standard and Bell & Howell Cartridge).
  - D. Miscellaneous (opaque projector, overhead projector, record player, 8mm film loop projector).

The pieces of equipment from these categories will be randomly

selected, so it is essential that you know all pieces of each category well.

3. If you demonstrate competency on these seven pieces of equipment you will have completed the practical phase of testing. Competency means demonstrating all procedures on the checklist accompanying each machine. If you fail to adequately demonstrate your competency in the 16mm projectors or the Kodak Carousel Slide Projector, you will be asked to repeat the piece at least one day later. If you fail to demonstrate your competency in the pieces from the other categories, you will be asked to come back at another time (no sooner than the next day) to demonstrate all the pieces in that group. You can see that it is important that you do not ask to be tested until you are sure you are ready and can do everything on each of the checklists posted with the equipment.
4. When you feel you are ready and you have pre-tested yourself by reviewing the checklists, sign your name, phone number and course number on the sign-up sheet on the door of Room 18. The equipment lab will only be open during the times posted on this sheet. Reserve one 15 min. period for every 2 groups to be tested. If you do not reserve a time, you will not be tested. You do not have to sign up to practice. The lab instructors will keep the test sheets on file. When they are completed, they will be returned to the course instructor.

FINAL PROJECT  
(Application Phase)

The final project is intended as a culmination to all of the learning that occurred in this course. In this phase of the course, you are to apply the knowledge, skills and procedures already acquired.

To indicate these abilities, the final project may assume either of two forms: a mediated self-instructional module or a mediated classroom presentation. The goal of each is similar; the procedures are slightly different. The subject matter is completely optional; the design and production procedures are specific.

Design Stage:

1. State a general content area and a competency or skill that you want to develop in the learner.
2. Define at least one but not more than three behavioral objectives.
  - a) One may be terminal and one or more enabling objectives.
  - b) When writing the objectives, assume that the student is unfamiliar with the content.
  - c) Objectives should be written in the correct form including all necessary components.
3. Construct an evaluation instrument that tests the behavioral objective. (Note: The form of the test should be consistent with the objective. A multiple choice paper-pencil test should be used only if the content and behavior required in the objective are consistent with the multiple choice forms.)
4. State the instructional strategy.
  - a) Method: Determine whether you want to produce a self-instructional module or do a classroom presentation. Is the nature of your objective and content more amenable to independent or group learning? Self-instructional modules must be fieldtested, i.e., tried out on one or more subjects of the appropriate age or background. Test data and attitude feedback need to be collected. The module would then be set-up in the McNutt Center, so that the instructor could work through it and evaluate it.

The classroom presentation would be performed before a group at specified time at the end of each semester. You would sign up for a specified time during these sessions to present your lesson. Your lesson will be evaluated by all present using the criteria stated below.
  - b) Task Sequence: List the sequence of topics and activities, converting them into a task sequence (similar to flowchart technique used in this text) for the student to follow toward attainment of the objective.

5. Select the instructional media and methods you will use. Describe the media formats to be used and be able to justify your choices, as in the Practicum Exam.

The above materials should be written up in a Project Prospectus, using as terse a form (listing, outlining) as possible.

6. Schedule a conference with the instructor as early as possible, bringing this prospectus for your Final Project with you. This conference should occur some weeks before the final presentation to provide enough time to produce and test the materials. Following this conference, you will know exactly what you have to produce for the project.
7. Prepare a transparency (written sheet for self-instructional module) stating your instructional goal, objective(s), and a description of the learners for whom the presentation is prepared (eg. grade level, learning ability, socioeconomic status). This should be presented for a brief period (30 seconds or so) prior to teaching the lesson in the class or to the instructor prior to working through the self-instructional module.

#### For Self Instructional Module:

8. Locate a "student" of equivalent description to the learner characteristics. Pretest the student using the instrument described in the prospectus.
9. Let the student work through the materials, providing guidance only when necessary.
10. Posttest the student after completion of the module using the same instrument. Ask the student about their attitudes toward the materials.
11. Set the module up in the center. Inform the instructor so that he/she may preview the materials. Provide the instructor with test data, the prospectus and the statement required in step 7.

#### For the Classroom Presentation:

8. Involve the remaining students in the 547 class in the learning activities selected. The students in the class will act as the students who would normally be taught.
9. Direct and guide the learning activities throughout the lesson which should last 5-10 minutes. (You will be checked to see that this is observed.)
10. Provide situations for using the learning involved.
11. Evaluate the outcomes of the process using the instrument stated in the prospectus.

#### Required of All Students:

1. For the "C" and "B" tracks, you must design and produce at least two media to specifically meet your objectives. For the "A" track, you

must produce those two plus an additional medium from the interactive group (CAI, PI, game, simulation, or "program" (using inserted questions) your other media (using as a model the filmstrip/tape presentations "Educational Objectives" and "Selecting Educational Objectives."

2. You may employ media produced as Learning Activities in your presentation if they are appropriate, but they will not satisfy the production requirements for the final project.
3. You will be evaluated according to these evaluation criteria.

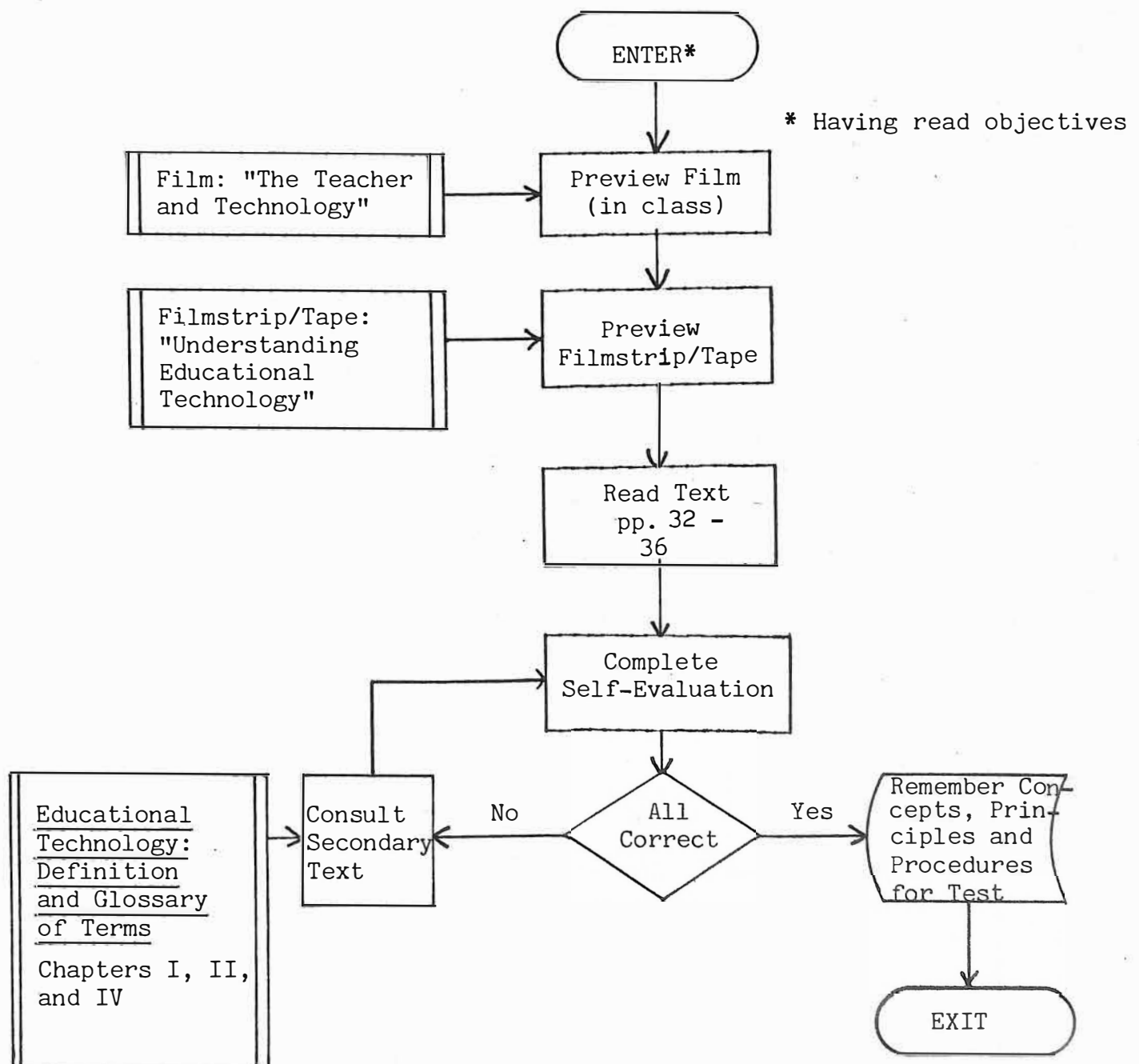
	<u>Max. Pos.</u>
Behavioral objective clear to class	10
Evaluation procedures (relationship to objectives)	5
Originality & appropriateness of the media	25
Organization of the presentation (appropriateness of the strategy)	20
Software quality	25
Execution (continuity, equipment operation, etc.)	15
	<u>TOTAL</u>
	100

INTRODUCTION TO EDUCATIONAL  
TECHNOLOGY: COURSE OVERVIEW

Instructional Objectives:

1. Be able to identify the functions in the Domain of Educational Technology to be included in the course.
2. Be able to list at least ten instructional media.

Task Description:



## THE FIELD OF EDUCATIONAL TECHNOLOGY

As can be perceived from the Domain of Educational Technology (see Figure 1) introduced in the filmstrip/tape presentation, "Understanding Educational Technology," the field is complex and multi-faceted. Instructional media, as a term and title of this course, may be assumed to be subsumed by the field of educational technology, i.e., instructional media is a subset of educational technology. Gone are the days of audiovisual aids. The supplementary use of media materials (when and where available) without regard to effect or need occurred in early days of media (1950's). Media were "innovative" and federal support was liberal. Films, records, transparencies, and so forth were used because it was "implicitly good." Kids had to learn better media were the new panacea. This implicit goodness hypothesis probably did more to forestall the growth and development of educational technology than any other single cause. Expectations were unfulfilled. Educators simply did not know how to best apply the materials they were creating.

Through the development of instructional systems theory and the partial merger of educational psychology with educational media, the field has evolved into educational technology, the development, integration and management of instructional systems designed to fulfill specific learning needs.

The definition of the field presented in the filmstrip/tape presentation represents a conceptual state of the art of educational technology. It is the sanctioned statement of the Association for Educational Communications and Technology, the professional association representing the media profession. The definition of the field delineates the complex functions that are identified with the educational technology.

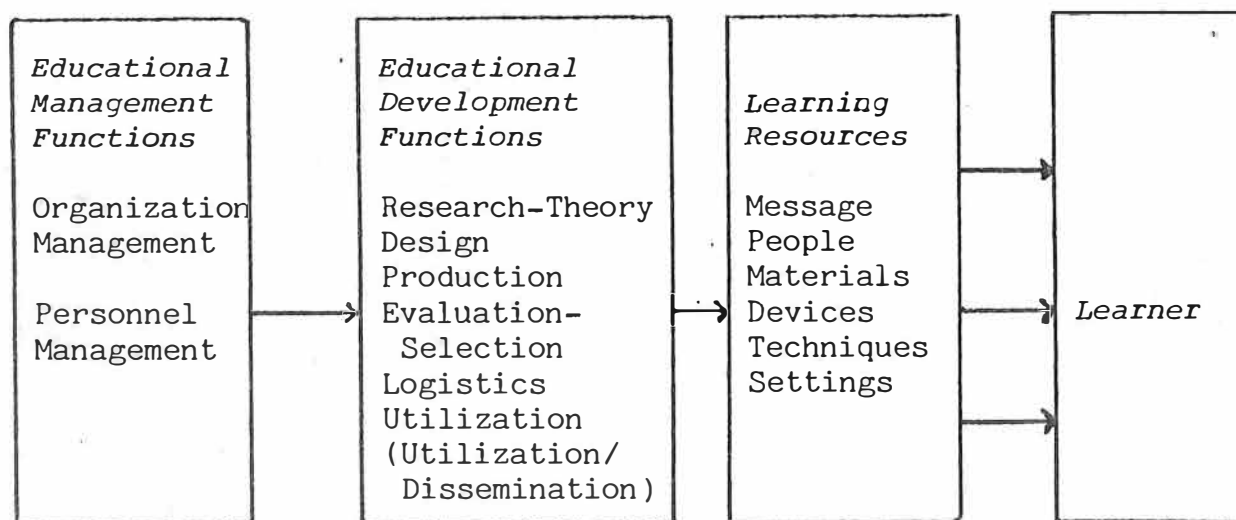


Figure 1. DOMAIN OF EDUCATIONAL TECHNOLOGY



Any course must necessarily limit it's scope. It surely could not begin to cover the whole field of educational technology. In the book, *Educational Technology: Definition and Glossary of Terms*, by AECT, the functions presented in the filmstrip are defined and examples are given (see Tables 1 and 2). The expectations of this course will be related to these functions. The functions identified will be treated more in depth in the units of this text.

The message will not be the primary focus of this course, however, implicit in all of the materials produced and the instruction designed, an underlying message or subject content is necessary. Both the message and people components will be most pertinent during the final presentation, in which you will utilize all of the skills and knowledge acquired in the course to design, produce, and present a mediated lesson to faculty and peers.

The material and device components comprise the focus of this course. A fundamental aspect of implementing instructional systems is the ability to design and produce materials and the ability to effectively present them, using the appropriate hardware or equipment. These competencies will be acquired in the context of appropriate utilization principles, which comprise the Technique and Setting components, though the latter is not emphasized. These Learning Resources Variables are probably the most important components of this course.

This course is not intended to produce instructional designers or production experts; however, many of the fundamental competencies required of such people will be covered in this course. It is not enough to be able to produce materials and operate equipment without providing an appropriate instructional context or being able to design effective materials. The ability to select appropriate and effective materials from the panoply of those commercially available is also a fundamental skill. Design functions emphasized will be the writing of objectives and determination of appropriate media. Production skills will include most of those presented in the table. Evaluation of available materials and selection of appropriate medium will also be included. These combine to provide a comprehensive sampling of primary media skills.

It is beyond the scope of this course to deal with management functions. Separate courses are available that are oriented specifically to those competencies, while additional, advanced courses relating to the system components and design functions are also available. These tables are presented merely to provide you with an overview of the field of educational technology which will serve to orient your experiences in this course. It is a challenging and expanding field. The skills learned in this course will serve you for some time to come.

TABLE 1  
Learning Resources/Instructional System Components

Resource or Component	Definition	Examples
Message	Information to be transmitted by the other components; takes the form of ideas, facts, meanings, data.	Any subject matter/content, e.g., the history of the Greeks; Ohm's Law; World Series results; the parliamentary system of government; conjugation of the verb "to be."
People	Persons who are acting to store and/or transmit Messages.	Teacher; student; actor; speaker.
Material	Items (traditionally called media or software) which usually store Messages for transmission by devices; sometimes self-displaying.	Overhead transparency; slide; filmstrip; 16mm motion picture; 8mm motion picture; videotape; record; audiotape; programed instruction materials; computer-assisted instruction program; book; journal.
Device	Items (traditionally called hardware) which transmit Messages stored on Materials.	Overhead projector; slide projector; filmstrip projector; 16mm film projector; 8mm film projector; videotape recorder; television set; record player; radio; tape recorder; dial access information retrieval system console; teaching machine; talking typewriter; computer devices.
Technique	Routine procedures or precast molds for using Materials, Devices, Settings, and People to transmit Messages.	Computer-assisted instruction; programed instruction; simulation; gaming; discovery; inquiry; field trip; team teaching; individualized instruction; self-instruction; group instruction; lecture; discussion.
Setting	The environment in which the Messages are received.	Physical: school building; instructional materials center; library; studio; classroom; auditorium. Environmental: lighting; heating; acoustics.

From Educational Technology: Definition and Glossary of Terms.

TABLE 2  
Educational/Instructional Development Functions

Function	Definition	Examples
Design Purpose:	To translate general theoretical knowledge into specifications for Learning Resources or Instructional System Components.	To design programed instruction materials. To develop instructional modules for individualized instruction. To design equipment systems.
Outcome:	Specifications for production of Learning Resources and Instructional System Components, regardless of format or resource.	To write general objectives. To determine medium. To describe technical systems.
Activity:	Analyzing, synthesizing, and writing objectives, learner characteristics, task analyses, learning conditions, instructional events, specifications for Learning Resources and Instructional Systems Components.	Analyzes objectives. Synthesizes objectives/sequence/content/media. Arranges materials in sequence.
Production Purpose:	To translate specifications for Learning Resources or Instructional Systems Components into specific actual items.	To produce audiotapes. To direct motion picture. To write computer programs for computer-assisted instruction.
Outcome:	Specific products in the form of test versions, prototypes, or mass-produced versions.	To make slides into test filmstrips. To decide on music/sound effects. To match audio and visuals.
Activity:	Operating production equipment, drawing, laying out, writing, building products.	Mixes narration tape and sound. Sequences slides using viewer. Operates motion picture camera.
Evaluation-Selection Purpose:	To assess acceptability of actual produced Learning Resources or Instructional System Components in terms of criteria set by other functions, and to develop models for this assessment.	To pilot test prototype instructional materials. To preview and select instructional materials. To develop evaluation models and techniques.

Table 2 (cont'd)

Outcomes:	<p>(a) Evaluation for Design: effectiveness of Learning Resources or Instructional System Components in meeting their objectives.</p> <p>(b) Evaluation for Production: acceptability of items in meeting production standards.</p> <p>(c) Evaluation for Evaluation: evaluation models.</p> <p>(d) Evaluation for Selection: acceptability of items for acquisition for a specific purpose.</p> <p>(e) Evaluation for Utilization: acceptability of items for meeting learning objectives in actual use.</p>	<p>To identify problems with materials.</p> <p>To identify objectives not met.</p> <p>To insure acceptable sound quality.</p>
Activity:	Analyzing quality in terms of standards.	<p>Compares data and objectives.</p> <p>Observes students using materials.</p> <p>Analyzes possible uses of materials.</p>

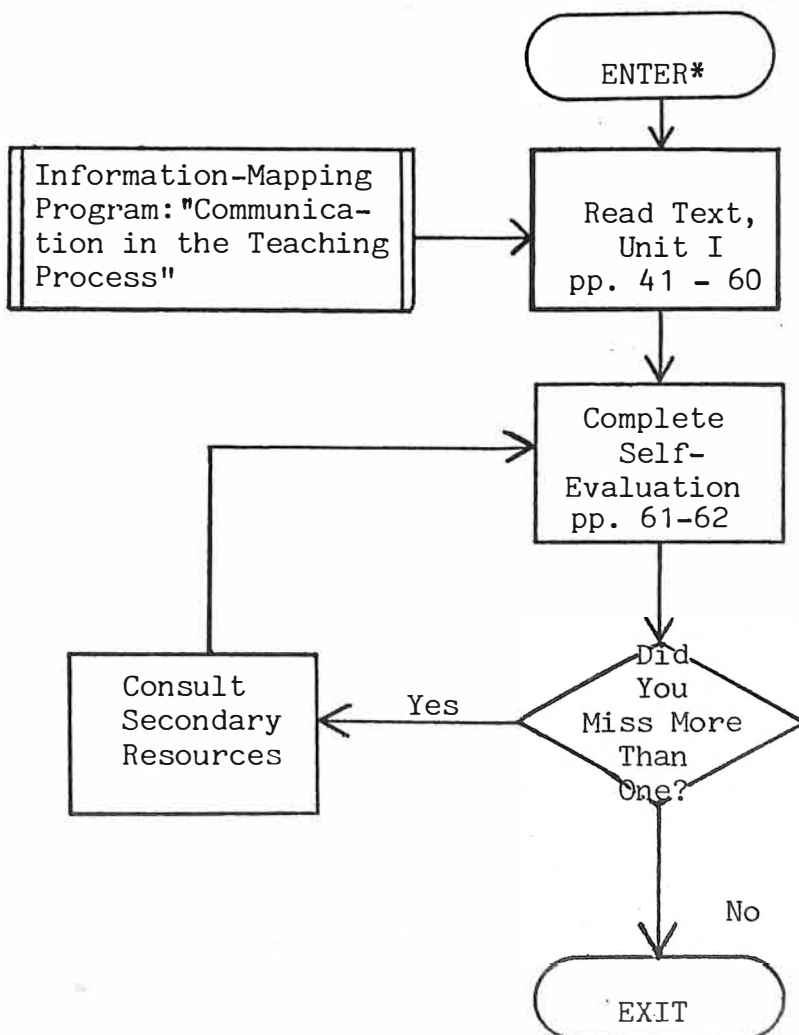
From Educational Technology: Definition and Glossary of Terms.

## COMMUNICATION AND TEACHING

### Instructional Objectives:

1. Be able to diagram the flow of communication in the teaching process, including all component parts.
2. Given a list of instructional media, be able to hierarchically arrange them along the concreteness-abstractness continuum (Dale's Cone of Experience).
3. Be able to list the important variables in the teaching-communication process, describing their functional importance to the process.

### Task Sequence:



\* Having read objectives

### Instructional Media:

Instructional media as defined in the first unit, Introduction to Educational Technology, are communication media. They function as a medium for a message being transmitted by the sender to a receiver. The message is the instructional content or subject matter (economics, Ohm's Law, etc.). The sender is the teacher, instructional designer or the school system (perhaps even parents). The receiver in the instructional communication process is the student or learner. So, the person responsible for student learning tries to convey messages in the form of learning activities to students. The use of instructional media is supposed to facilitate that transfer of information or knowledge. According to this communication model, the first stage in learning entails the communication and reception of the instructional message.

It should be obvious that the numerous types of media involve learners in many different ways. Some require reading, some require writing or other overt behavior, while others depend on more covert, assimilative processes. That is, learning occurs on different levels (see Figure 1). Direct or active learning requires overt behavior. Learning results from the involvement with the materials or activities (the practice effect).

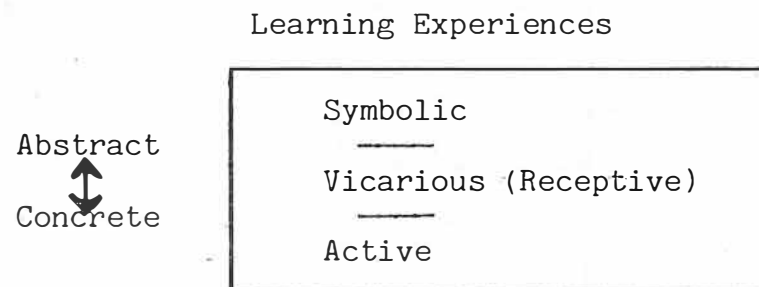


Figure 1.

Most instructional media represent vicarious learning experiences. When someone mediates (converts into an instructional medium) an object or event, they are changing the form of that object and event. To the extent that it is described by its form, the substance itself is being altered. The mediation process reduces the event to a more abstract representation of the original. A 2" x 2" slide of a mountain cannot possibly replace or supplant the experience of being on that mountain, climbing it or merely observing it from a

distance. When we mediate objects or events, we remove them at least one step from reality. We experience the original object or event vicariously, not in reality. There is a substantive difference. The nature of this course, however, does not justify explication of the philosophical distinctions implicit in mediation. Suffice it to accept that a mediated event is more abstract than the real event.

The most abstract type of learning experience occurs on the symbolic level. These learning experiences entail the use of visual and verbal symbols to represent an object or event. A verbal description of your mountain is obviously more abstract than a picture which is in turn more abstract than the real thing. Media people contend that too many learning experiences are predicated on symbolic means of communication. We try to communicate difficult concepts with abstract, verbal messages. If we visualize or otherwise mediate some experiences on a more concrete, vicarious level, they would be more easily communicated. So the argument goes.

#### Dale's Cone of Experience:

Considering the use of instructional media, it is possible to derive such a hierarchy of learning experiences. It was done several years ago by Edgar Dale, in the form of a Cone of Experience (see Figure 2).

The Cone of Experience hierarchically arranges more specific types of classroom learning experiences, the most concrete being direct purposeful experience. Simulations of reality in the form of contrived experiences would be slightly more abstract (removed one step from reality). The middle levels of the cone represent vicarious learning experiences and the top abstract or symbolic experiences.

In describing learning experiences, we must consider the level of abstractness, type of learner, and counter-balance those with logistical variables. Younger children and students of lower mental ability generally learn better from more concrete learning experiences. As pupils age and develop more formal logic systems, they are better able to learn from abstract learning experiences. On the other hand, concrete learning experiences are generally more expensive, difficult to arrange, and time-consuming for the teacher and the student. Abstract or symbolic experiences can be easily duplicated and distributed to a class of students. The conflicting needs, the need to provide meaningful learning experiences and the logistic, fiscal, and time constraints

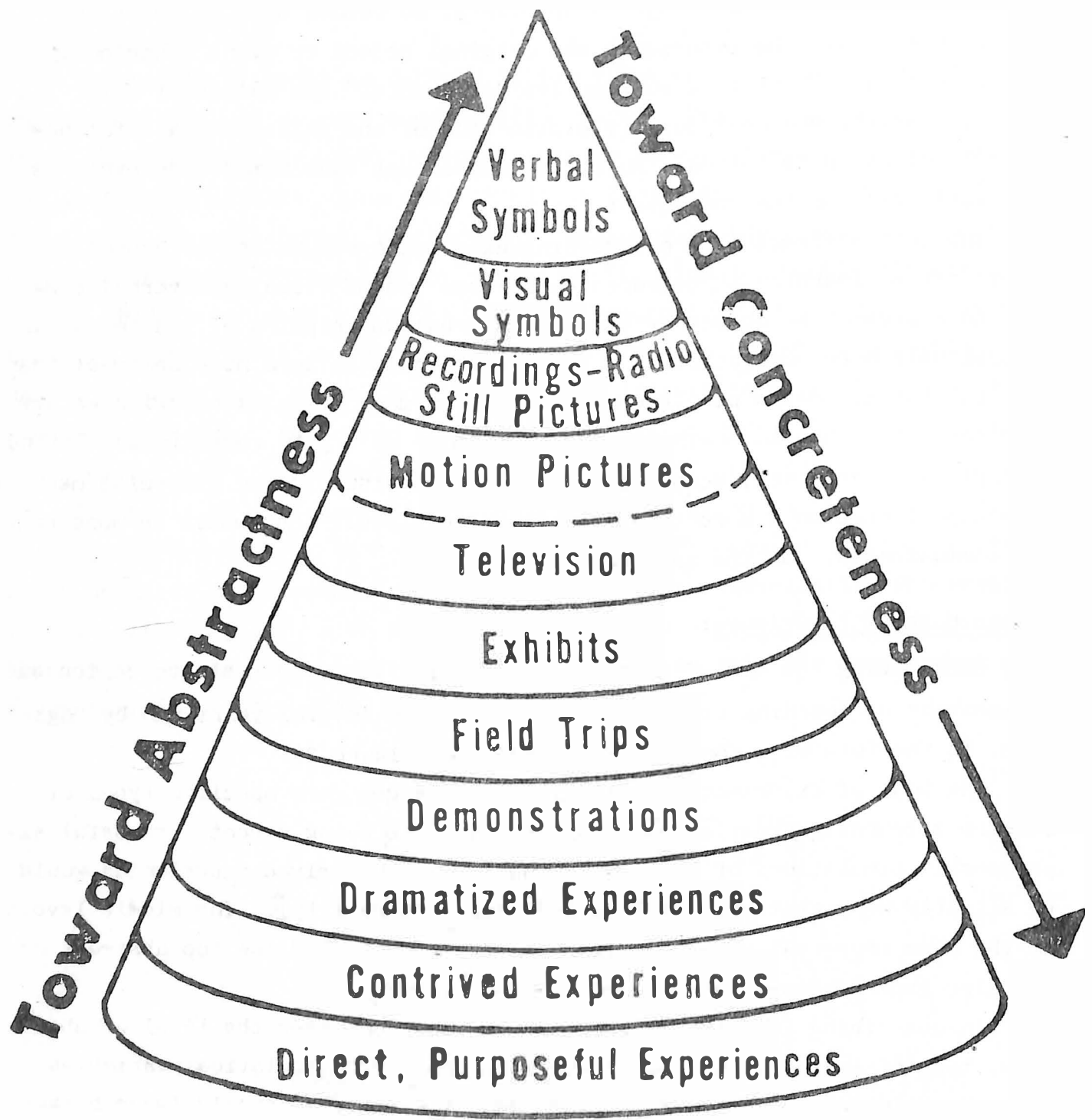


Figure 2. DALE'S CONE OF EXPERIENCE

imposed by schools have to be reconciled. Dale's Cone of Experience merely represents a means of conceptualizing this dimension of learning experiences. The decision has to be made in each classroom.



COMMUNICATION IN THE TEACHING PROCESS

by

Larry Falk

The communication process is a fundamental part of teaching, since all teaching requires the successful transmission of ideas to the learner. Furthermore, the medium chosen to transmit these ideas is only one of the closely interrelated elements of the communication process. Consequently, to truly understand the role of media in education, we must look at all elements of the communication process.

Realistically, you cannot expect to become a communications expert after this short course, for expertise in communications, like all other fields, only comes after many years of practice. On the other hand, we do believe that the ideas and relationships developed here will help you teach more effectively, and help you design and use media more effectively.

THE TEACHING PROCESS

## INTRODUCTION

---

We'll start by describing the major steps in the teaching process and see how communication is related to each one. Those readers who have had a considerable amount of teaching experience can use this section as a quick review.

The following list of steps in the teaching process will give you a preview of things to come. The steps are listed in the order that they most commonly occur.

- o Motivating the learner
  - o Recalling earlier learning
  - o Presenting new material
  - o Encouraging the learner to actively respond
  - o Encouraging appropriate practice
- 

## MOTIVATING THE LEARNER

---

**THE TEACHER'S ROLE IN MOTIVATION** Although the final decision on involvement in the learning experience must be made by the learner, he (or she) may be influenced by others, especially by the teacher. The learner is motivated to become involved when he (or she) identifies with the learning objectives. If these objectives are self-initiated, the learner will have very little difficulty identifying with them. The learner can only identify with the objectives in very few instances, however, so most of the time you'll have to do it for him.

---

**DESCRIBING THE OBJECTIVES** As a consequence, you must plan to show how the subject matter relates to their previous experience, their aims and their interests. This will help them to identify more closely with the objectives.

At times the subject will have a long-range objective rather than an immediate one. Whenever this happens, you must relate the learning to the student's future activities outside the immediate school setting.

The task of describing these objectives is far from an easy one. Care must be taken to avoid descriptions that are too general; or on the other hand, too specific. Most important of all, the objectives must be stated in terms the student will understand based on his (or her) past experience.

---

**CONTINUOUS MOTIVATION** Motivation is not a "one time thing" used only at the beginning of each learning session. It must be kept at a reasonable level throughout the learning experience, and "peaked up" from time to time. This is especially true when approaching a new topic or a new level of difficulty.

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## RECALLING EARLIER LEARNING

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**TEACHER'S ROLE IN RECALL** Most subjects or courses are divided into segments of convenient size; and these segments are, in turn, arranged in an hierarchy or sequence. Usually this sequence is selected to insure that prerequisite skills are mastered before new ones are introduced. These skills may have been mastered at different stages in the present course or in earlier courses. But, no matter when the prerequisites were originally covered, the teacher must help the students recall the previously acquired knowledge before starting the new learning experience.

---

**TEMPORAL CONTIGUITY** It has been found that close temporal contiguity between the old and the new increases learning efficiency. In contrast, attempting to learn a new idea when some previously acquired concept cannot be recalled, results in lengthy delays and frustrations.

---

**VERBAL RECALL** Although many different methods can be used for stimulating recall, verbal instructions are the most common, and certainly the most effective.

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## PRESENTING NEW MATERIAL

---

**COMPLEX OPERATION** Our first impulse is to think of the presentation of new material to students as a fairly simple operation, whereas, this is actually one of the most complex operations a teacher must perform. For instance - they must present basic information simply and meaningfully, they must explain things from the student's point of view, they must provide interesting examples emphasizing the vital points, they must show the learner how to differentiate between similar ideas, and they must vary the intensity of the messages so the students are neither bored nor overwhelmed.

---

## ENCOURAGING THE LEARNER TO ACTIVELY RESPOND

---

**CRITICAL QUESTIONS** If the student is to identify with and remember the learning experiences - he (or she) must be encouraged to actively respond during the experience. That is, be an active producer and user, rather than a passive recipient of knowledge. The teacher can test his lesson plans for active responding by asking the following questions:

- Will the learners have the opportunity to integrate the ideas?
- Will the learners have the opportunity to dissect the ideas?

---

Will they be given the opportunity to find examples?  
Will they be given the opportunity to describe these examples?  
Will they be asked to draw inferences from the ideas presented?  
Will they be given the opportunity to derive and apply new concepts by themselves?

---

#### PROVIDING IMMEDIATE FEEDBACK (KNOWLEDGE OF RESULTS)

---

**NECESSITY FOR FEEDBACK** Since you will be planning for learner responses, you must also plan to provide feedback (knowledge of results).

Once the learner has provided a response, he naturally wants to know the outcome. If the learner doesn't get immediate feedback, he'll lose interest in the operation and won't have the incentive to respond the next time. Even an indication that his response was incorrect can make the experience rewarding, provided that you tell him how his mistake arose and help him to see the correct answer.

---

**PROVIDING FEEDBACK** Feedback can be most speedily provided by human interaction. Furthermore, learners who are given individualized verbal comments tend to improve significantly more than those given standard comments.

---

**NON-VERBAL FEEDBACK** Not all feedback uses symbols (words and numbers; spoken or written). Non-verbal feedback such as smiles, scowls or hushed silence, may have just as strong an influence.

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#### ENCOURAGING APPROPRIATE PRACTICE

---

**CONTINUOUS MOTIVATION REQUIRED** Even with active responding, learning can't be accomplished in just one "pass" through the material. Practice is required to assist in memorization; and in many instances, to visualize all the ramifications of an idea. This is especially true in higher level learning (concept learning, principle learning and problem solving). In most cases, the learner must be motivated to start practicing, and must be continuously motivated during the practice period.

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## SUMMARY

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Now that you've seen the major elements of the learning process that require communication between the teacher and the students, it's time to turn your attention to the communication process itself.

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IMPROVING COMMUNICATION IN THE TEACHING PROCESS



THE ROLE OF  
INFORMATION

Perhaps the best way to start is to describe some of the basic concepts of communication in a meaningful way. By doing this, we'll develop a firm foundation for understanding the concepts that will be developed here.

Information is the reason for the existence of all communication. it's what distinguishes communication from other human activities, such as: eating, sleeping, working, etc. For the individual to perform most of these other activities, they must first obtain information from outside sources. For example - if you are to decide what to eat, you must first find out what types of food are edible, where to find these foods, and how to prepare them.

At this point it is important to note that information only helps you to make decisions. It doesn't actually make decisions for you; for decisions are arrived at by internally processing both newly acquired information and information stored previously.

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PERCEPTIONS  
AND  
EXPERIENCES

The social relationship between individuals who are communicating and the acts they perform are both out in the open. Because of this, you might be tempted to conclude that communication is a simple process. But, the situation is not as simple as it first appears, for the relationship between the participants in a conversation is really only a matter of images.

Each person perceives the other from their own point of view. But, it's extremely unlikely that these perceptions will be the same.

In addition to the actual participants in a conversation, there are other people in the relationship - all the people the participants have been influenced by in the past. These include the people they admired, the people who taught them their skills and beliefs, and the people who rewarded them for their behavior.

Each person brings his (or her) own fund of experience into the conversation. He (or she) uses this experience to interpret the signals that come to them and decide how to respond. If the participants are to communicate effectively, they must have a shared store of experiences on the topic they are discussing.

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COMMUNICATION  
CONTRACT

So far we've considered how people see each other when they communicate, but we might even look further back and ask - Why did they start talking to each other in the first place? Actually, in a sense, the people who are communicating enter into a kind of a contract, with each one performing a service and expecting something in return. As a simple example, let's imagine you've dialed "information" to obtain a telephone number. You expect a courteous and accurate reply. And, on the other hand, the "operator" expects you to listen carefully, record the number and be grateful.

As another example, and one that's closer to our present interests - let's consider the contract between a teacher and a student. On his (or her) part, the teacher agrees to give the student a systematic view of useful knowledge, and to provide the oppor-

tunities for practicing what he (or she) needs to know. On their part, the students agree to put a certain amount of trust in the teacher, and (we hope) the willingness to engage in the learning activities.

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## THE BASIC COMMUNICATION PROCESS

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INTRODUCTION	Now that we have some background in communication, let's take a closer look inside the communication process itself. Basically, there are two people performing certain communication actions, and then there is the information flowing between them. This information consists of sounds, gestures, written symbols (words) and pictures.
INTERNAL ACTIONS	Obviously, some internal action must go on before the information is sent. First of all, the sender (source) must have a purpose for communicating. Then, once the decision is made to send information - the ideas must be encoded into symbols and the symbols arranged so the receiver will understand them. Encoding utilizes the vocal mechanisms, the muscle systems in the hands (for writing and gestures), and the muscle systems in the rest of the body (to produce expressions and body motions).
MESSAGE TRANSMISSION	Once encoded, the information must be transmitted to the intended receiver through a channel or medium. Transmission of information takes a finite amount of time. So, we find that, at some interval of time, the message is separate from (and completely out of the control of) both participants. This interval may vary from a short one in face-to-face communication, to a long one in books; with letters falling somewhere in between. During the transmission interval, and for some time after it, the sender doesn't know whether his message has been received, since he's dependent upon the response from the receiver.
FEEDBACK	This response is known technically as feedback. The amount of feedback received is dependent upon the type of communication used. In face-to-face communication, the sender can quickly judge whether the receiver is interested in the conversation by his expressions. Then, when the receiver replies, the sender can tell whether the receiver has understood the message.
THE RECEIVER	<p>So far we've said very little about the receiver. But, in actuality, the receiver is the basic reason for communicating. The sender may have a tremendous store of information and be ready to send it; but without the receiver there can't be any communication.</p> <p>When the information is accepted by the receiver, he (or she) must decode it to extract the ideas generated by the sender. While decoding the message, the receiver processes the ideas in accordance with his (or her) own image of the situation - based on his (or her) own ideas and experiences.</p>

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## THE TEACHER AS A COMMUNICATION SOURCE

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INTRODUCTION     There are at least four major factors affecting your capabilities as a communication source:

Communication Skills  
Attitudes  
Knowledge Level  
Socio-Cultural Position

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### THE TEACHER AS A COMMUNICATION SOURCE (COMMUNICATION SKILLS)

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BASIC SKILLS     As sources, your communication skills affect your ability to communicate in two ways. First of all, they affect your ability to analyze your own purposes and intentions. Secondly, communication skills affect your ability to encode the messages you intend to send.  
Generally speaking, there are three basic communication skills that you need. Two of them are encoding skills - namely, writing and speaking; and the third is thinking.

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SKILLS FOR WRITTEN AND SPOKEN MESSAGES     For the moment, let's assume you have a well-thought-out purpose for communicating. To accomplish this purpose, you must create a message that will elicit the desired response from the receiver.  
  
If you are sending a written message, you must use the vocabulary that your receivers will understand; and at the same time, will adequately express your ideas. Then, you must know how to put your words together so your meaning is clear (message treatment). Finally, you must know how to spell properly so your readers will recognize the words.  
  
If you are speaking, you will also need to know how to pronounce words, how to gesture, and how to interpret the feedback you receive from your listeners.

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### THE TEACHER AS A COMMUNICATION SOURCE (ATTITUDES)

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INTRODUCTION     From the point of view of communication, attitude can be most simply defined as the tendency to approach or avoid a person or a topic of conversation. If you approach the other participant in the conversation, you have a favorable attitude toward them. But, if you avoid them, you have a negative attitude.

Careful analysis reveals that there are three aspects of attitude that affect our ability to communicate - attitude toward self, attitude toward the subject and attitude toward the receiver of the communication.

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ATTITUDE TOWARD SELF	The first of these, attitude toward self is quite important; since self-confidence can significantly affect your ability to communicate. The teacher who suffers from "stage fright" is one example of the lack of self-confidence. The success of courses like those offered by the Dale Carnegie Institute can be attributed to an increase in self-confidence. One thing you can do to increase your self-confidence is to know your topic completely, and another is to practice your lesson beforehand.
ATTITUDE TOWARD THE SUBJECT	The second attitude influencing your communicating ability, is your attitude toward the subject matter. If you don't like the subject matter or you don't think it's important, you'll find it very difficult to exert your full effort. Of equal importance, it's difficult to convince your students that the subject is important. Although some of us are capable of hiding our attitude toward a subject, many of us cannot. And if you cannot hide your feelings completely, sensitive students will readily detect your lack of interest.
ATTITUDE TOWARD THE STUDENTS	Finally, let's look at the third aspect of attitude affecting communication - your attitude toward your students. If you, as the teacher, have a negative attitude toward your students, both the messages you send and your students' responses will be affected. If your students feel that you really like them, they will be much less critical of the message you send, and more likely to accept them.

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#### THE TEACHER AS A COMMUNICATION SOURCE (KNOWLEDGE LEVEL)

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SUBJECT MATTER KNOWLEDGE	It seems fairly obvious that the amount the teacher knows about the subject can affect his (or her) ability to communicate. If you don't know the subject, you can't discuss all the aspects effectively. On the other hand, if you know too much, you may not be able to talk to the students at their own level. Your approach may be too technical, and you may even overlook the simple things that the beginning student ought to know.
TEACHING VS. SUBJECT KNOWLEDGE	The next question to be considered is - What's more important, knowing the subject matter or knowing how to teach? Some experts claim that all you need is a thorough knowledge of the subject, while others claim that a skillful teacher can teach any subject. Clearly, the answer must fall somewhere in between - you must know both the subject matter and how to teach it.
COMMUNICATION PROCESS KNOWLEDGE	In addition, you must have a knowledge of the communication process: your attitudes, the characteristics of the students, the ways to treat and interpret messages, and the effectiveness of the various communication channels.

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## THE TEACHER AS A COMMUNICATION SOURCE (SOCIO-CULTURAL PROBLEMS)

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### MODIFY YOUR TECHNIQUE

People in different social classes communicate differently, and people in different cultural backgrounds communicate differently. Social and cultural systems partly determine the word choices people make, the reasons they have for communicating, and their choice of communication channels.

Since it's difficult for the students to remove themselves from their environment, you have to modify your means of communicating to reach the students at their own level; and then gradually strive to improve their communicating techniques.

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## THE TEACHER AS A COMMUNICATION SOURCE (SUMMARY)

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To sum up, we've briefly looked at the factors affecting the sender's ability to communicate: communication skills, knowledge level, and the socio-cultural problems. Now let's move along to the next ingredient of the communication process: the message.

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## THE MESSAGE

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### TWO PRIMARY FEATURES

There are two primary features you must consider when analyzing messages to improve your communicating ability - the symbols you use, and the message treatment.

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## THE MESSAGE (SYMBOLS)

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### SYMBOLS AND MEANINGS

First, let's look at what we mean by symbols. When you speak, the symbols are the words and gestures that you use. And, when you write, the symbols are the words and punctuation marks that you use.

As you've seen previously, after the message has been sent it exists separate and alone, between the two persons who are communicating. The symbols meant something in the mind of the sender, and will mean something in the mind of the receiver. But, these meanings may not both be the same.

Our basic problem is - Just how does this difference in meanings affect communication?

When two people communicate, the symbols are shared, but the meanings are never perfectly shared; since the meanings are based on personal experience. We can observe actions, and we can ask questions; but we never can tell exactly what goes on inside the other person.

Things are not as bad as they seem, however, since a certain amount of meaning is shared by all people in a society or we wouldn't be able to communicate at all.

One bit of evidence we have is the existence of dictionaries. These are storehouses of shared meanings for the verbal symbols of each language. But, even these shared meanings change with time, so our dictionaries must be periodically updated.

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### NON-VERBAL SYMBOLS

Symbols can be either verbal or non-verbal. Non-verbal symbols use visual, auditory, tactile (touch), kinesthetic (muscular motion), and olfactory (smell) cues. From all that can be determined, these non-verbal symbols are used to communicate in two different ways, as described below.

First of all, non-verbal symbols may be used to carry information without any need for words. Examples of these are: drawings, paintings and television images. These symbols tell us what an airplane looks like, what we see from an airplane, how to operate a machine, or how to perform complex psycho-motor operations.

We'd be hard pressed to use words to express these meanings.

In the second place, we use non-verbal symbols to reinforce or expand verbal information. Gestures, pauses, various types of "looks", and other "body expressions" perform the same function as illustrations in textbooks. These non-verbal cues can indicate subtle shades of meanings, feelings, and other personal reactions which are difficult to convey with words alone. In addition to conveying meanings, the information they provide has a great deal to do with the impressions people form of each other.

In most cases, however, "body language" is hard to codify, for to some extent the meaning is bound to each situation. A shrug of the shoulders in one situation may not mean precisely the same thing as in another. What's more, a gesture in one culture may not mean the same thing as in another.

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### THE MESSAGE (TREATMENT)

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**INTRODUCTION** By treatment we mean: the method of arranging symbols within a message. For instance, you can arrange the content in a particular sequence, or you can leave gaps in the conversation for the receiver to fill-in his own thoughts, or you can summarize the message at the end.

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**TREATMENT AND TENSION** We might well ask - What determines treatment? Probably the most important factor is the receiver, since the message must be designed with the receiver in mind. Each receiver tries to impose a structure on everything he (or she) perceives. This structure reduces his (or her) tensions by reducing the uncertainties in the environment.

---

**TENSION IN LEARNING** Unfortunately, learning requires a temporary increase in tension, for it means that the learner has to change existing mental relationships and substitute new ones. Nevertheless, if the learner can be made to see that the new relationship will eventually produce less uncertainty, he (or she) will tolerate the temporary increase in tension brought on by learning. But the greater the increase in tension, and the greater the energy required to learn the new material; the less likely the learner is to act.

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**REDUCING TENSION IN LEARNING** One way you can improve your communication effectiveness is by designing your messages to reduce the amount of tension on the learners. To do this you must ask yourself the following questions and try to resolve them:

What are the learners looking for? How to pass the test?  
How to obtain praise? How to obtain self-fulfillment?

You must obtain answers to these questions before going any further, and then design your messages accordingly. In many cases, the answers to these questions may be inferred on the basis of limited evidence. However, you'll have to design your message on the basis of whatever evidence you have.

What kinds of analogies and examples make the most sense to the learners?

Analogies and examples must come from the learner's past experience both at school and at home. They should include well-known individuals or events (from sports, TV or the movies).

Can you arrange the learning material so the learners can proceed at their own pace?

To accomplish this objective, the material will probably have to be divided into small segments, and you will have to include exercises and questions at the end of each segment. These exercises and questions will give the learners the opportunity to determine whether they have accomplished the objectives for each segment.

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## THE LEARNER AS A COMMUNICATOR

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**INTRODUCTION** Now that we've looked at the characteristics of the message and its effect on the learner, let's take a closer look at the learner.

**COMMUNICATION SKILLS** First of all, the learner must have the communication skills to receive the message. The learner must be able to read, to listen and to decode incoming messages. He (or she) must be able to understand the words and gestures transmitted by the teacher. And, like the teacher, they must use thought. However, in this case, thought is used for decoding messages and for analyzing the purpose of the sender (the teacher).

**ATTITUDES** We must consider the learner's attitudes - attitudes toward self, attitudes toward the subject matter and attitudes toward the teacher.

Learners without self-confidence have difficulty concentrating on the subject as they're distracted by their own fears and anxieties. This means that you, as the teacher, must spend extra effort with the learners who display these symptoms. Part of this effort should be devoted toward improving their morale, and part devoted to reviewing the subject matter.

Obviously, attitude toward the subject matter can influence communication. If the learners are turned-off by the subject, you'll have difficulty getting the subject across. The techniques discussed earlier in this course (such as relating the subject matter to the learner's experience, aims and interests) should prove helpful in these cases.



The third attitude we have to consider is that toward the teacher. Certainly, if the learner has an antagonistic attitude toward you, he(or she) won't want to communicate. When you find this to be true, you must resolve these cases on an individual basis as soon as they become apparent. For the longer they persist, the more acute they become.

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KNOWLEDGE  
LEVEL

As in the case of the teacher, knowledge level is a critical factor. If the information is not brought down to the learners' level, the learners will not be able to decode it; and they'll rapidly lose interest. On the other hand, if the level is too low; the learners may feel offended and tend to ignore the message.

As indicated earlier, the learners have less knowledge of the communication process than you do. So, you'll have to prepare your messages to take into account this deficiency. This means taking special care to prevent incorrect inferences; and also means that you should transmit the message slowly, possibly repeating it in alternate forms.

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SOCIO-  
CULTURAL  
POSITION

Once again, you must consider the individual's position in the classroom social system and its effect on the communication process. Some symptoms of this are the learner's reluctance to ask questions; as well as, their reluctance to provide answers to questions and problems.

Part of the learner's reluctance to participate may be due to the awe-inspiring role of the teacher and part may be due to group pressure from the rest of the learners. Most individuals need the support provided by group membership and consequently value it. As a result - When students are asked to do something that doesn't conform to the group norm, they become concerned about the loss of social support. And, if they do commit themselves, they're risking some uncomfortable feedback from their peers.

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THE COMMUNICATION MEDIUM

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INTRODUCTION

Until now, we've seen how the teacher and the learner affect the communication process. Yet, in all of these discussions, we've only briefly mentioned the medium of communication.

As sources of communication, you must decide which medium you'll use to enable the learners to decode your messages with minimal effort. The medium involves the senses of sight, hearing, touch, taste and smell; as well as the physical means of transmitting the message.

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**SENSES  
STIMULATED**

In face-to-face communication it's possible to stimulate all senses. But, when anything is interposed, some restrictions are placed on the number of senses that we can use. To illustrate - radio only reaches the ear, and print only reaches the eye. In contrast, film and television reach both the ear and the eye, but not the tactile or olfactory senses.

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**AMOUNT OF  
INFORMATION  
TRANSMITTED  
IN VARIOUS  
MEDIUMS**

It seems reasonable to assume that it should be possible to transfer more information in a face-to-face situation.

Although this is true in general, we must sometimes weigh the skilled productions available in films and TV against the presentation that you can make in the classroom. Films and TV also offer the possibility of presenting information that is difficult or even dangerous to present in the classroom (such as: time-lapse photography of plants growing or high speed photos of explosions inside automobile engines).

Also, against the advantage of communicating through several senses at the same time, you must weigh the capability to concentrate attention when using only one sense. In this connection, some researchers have shown that human perception operates through only one channel at a time, either audio or visual. When you're using two senses, one part of the message may have to wait in the memory while the other is transmitted to the reasoning portion of the brain. Consequently, the individual cannot be expected to process twice the information when two senses are used.

---

**FEEDBACK**

Face-to-face situations provide the most opportunity for feedback. The teacher can constantly assess the affect of the message; can correct and explain, and amplify the message. In addition, the teacher can answer any objections. But, as the group becomes larger, there's less time to assign to each individual; and the opportunity for feedback is reduced.

When anything is interposed between the teacher and the learner, feedback is reduced. Thus, a telephone restricts the amount of feedback since non-verbal signals cannot be transmitted. Furthermore, interposing a mass medium, like radio or television, further restricts both the speed and the amount of feedback. As a result, when a program like Sesame Street is used; the effectiveness of the production must be tested by the studio audience, and by making arrangements for quick reports from teachers using the programs.

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**CONTROL OF  
PACE**

In face-to-face situations, the learner can ask questions, and can help steer the conversation to exert some control over its pace. The teacher can also assist in this operation by observing the learners and by modifying the pace accordingly. However, when more than one learner is involved, you must average out the feedback from all learners.

A learner listening to or viewing a broadcast has no control over the source. The only thing they can do is to switch channels or turn off the set.

In contrast, when a learner is reading a book, they can set their own pace - they can pause, think over a point, flip back the pages, and then proceed.

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#### COMBINED APPROACHES

In recent years a considerable amount of attention has been placed on combining various approaches. One way of doing this is to broadcast face-to-face discussions over the radio and television networks. And, a second way is to have your class watch filmed or televised programs, and then discuss them on a face-to-face basis. These combined approaches utilize the advantages of the various media.

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#### PRESERVATION OF INFORMATION

Face-to-face communication is gone in a second unless recorded by electronic means. Even a scene in a filmed or televised program is gone before we realize it, but we do have the advantage of "freeze frame", slow motion, and of being able to re-play the film or tape. The print medium, on the other hand, has a great advantage in its capability for preserving information; since facts, ideas and pictures can be readily retrieved; and are available as long as the book lasts.

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### COMMUNICATION MODELS

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#### INTRODUCTION

Communication models are often used to show the interrelationship between the various ingredients of the communication process in a concise way. These models range in complexity from very simple ones showing a few elements to sophisticated ones displaying many factors. We've included two simple models on the next page to summarize many of the concepts discussed up to this point.

These models appear in the illustrations on the next page.

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Figure 1

This model shows the characteristics of the teacher, the learner and the message in a pattern that will help you remember them. And, in addition, it shows the senses used to retrieve the messages. However, no attempt is made to show the flow of information between the participants.

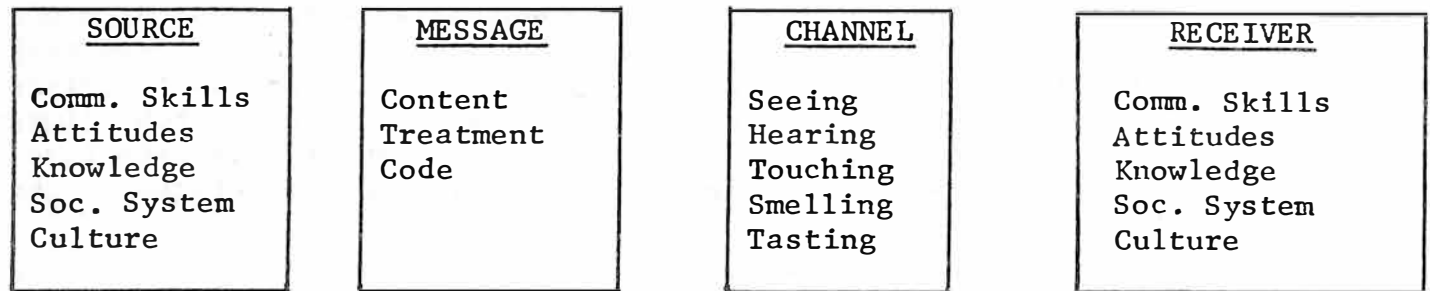
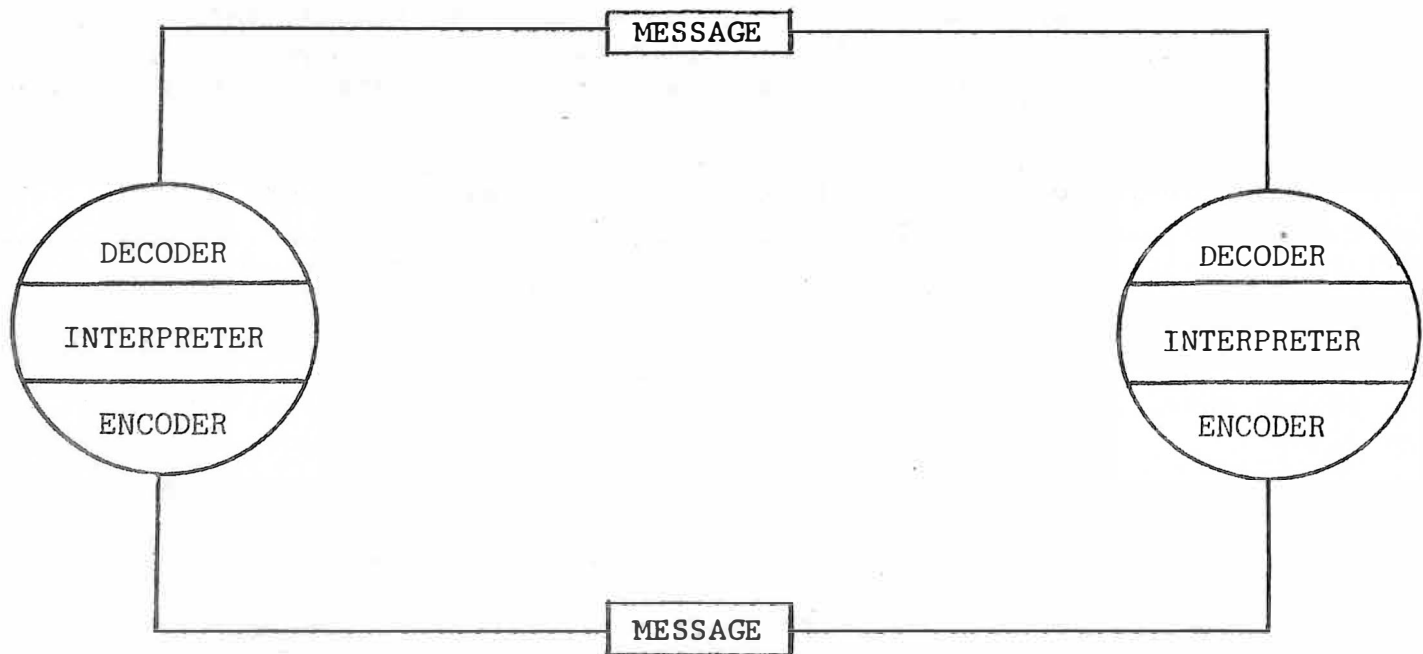


Figure 2

This simplified model leaves out many of the details in the previous one, but it does show the flow of information between the participants. The feedback concept is emphasized, with messages shown flowing in both directions.



## SELF-EVALUATION

1. Careful analysis reveals that there are three major aspects of attitude that affect your ability to communicate -- attitude toward \_\_\_\_\_, attitude toward the \_\_\_\_\_, and attitude toward the \_\_\_\_\_ of the communication.
  - a. communication, subject, receiver
  - b. media, subject, receiver
  - c. self, subject, receiver
  - d. social group, subject, receiver
2. Non-verbal symbols may be used to carry \_\_\_\_\_ without any need for \_\_\_\_\_.
  - a. messages, symbols
  - b. information, words
  - c. information, media
  - d. words, gestures
3. You have to modify your means of communicating to reach the students \_\_\_\_\_, and then \_\_\_\_\_ strive to improve their communication technique.
  - a. at the normal level, gradually
  - b. at their own level, gradually
  - c. at their own level, rapidly
  - d. at the normal level, rapidly
4. When two people communicate the \_\_\_\_\_ are shared, but the \_\_\_\_\_ are never perfectly shared.
  - a. words, gestures
  - b. symbols, meanings
  - c. meanings, words
  - d. words, intonations
5. Once encoded the information must be \_\_\_\_\_ to the intended receiver through a channel or medium.
  - a. transmitted
  - b. encoded
  - c. decoded
  - d. fed back
6. There are two primary factors you must consider when analyzing your messages to improve your communicating ability -- the \_\_\_\_\_ you use and the \_\_\_\_\_.
  - a. media, message treatment
  - b. symbols, media
  - c. attitude, message treatment
  - d. symbols, message treatment
7. Practicing free throws in basketball would be an example of which type of learning experience?
  - a. symbolic
  - b. vicarious
  - c. active

Self-Evaluation (continued)

8. According to the Cone of Experience, which type of learning experience is most abstract.
- a. film
  - b. television
  - c. simulation

ANSWERS:  
1. c  
2. b  
3. b  
4. b

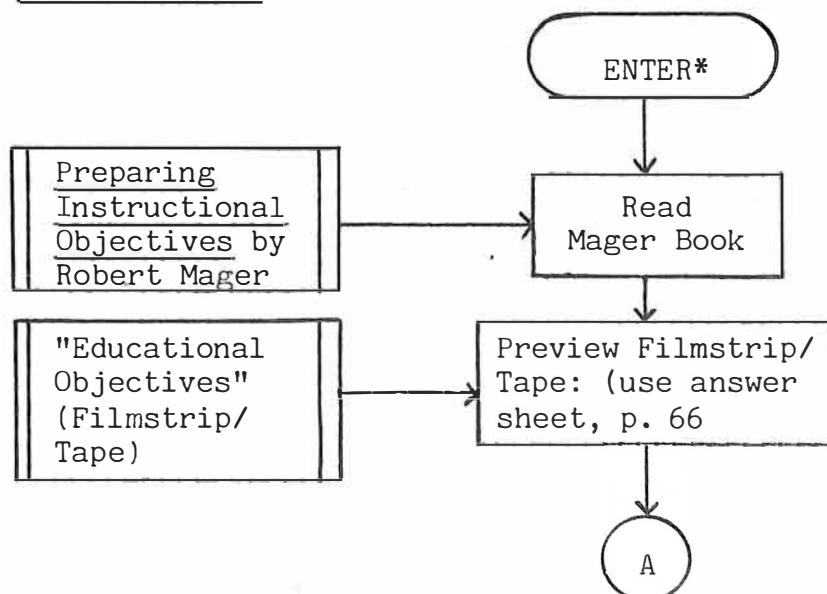
5. a  
6. d  
7. c  
8. a

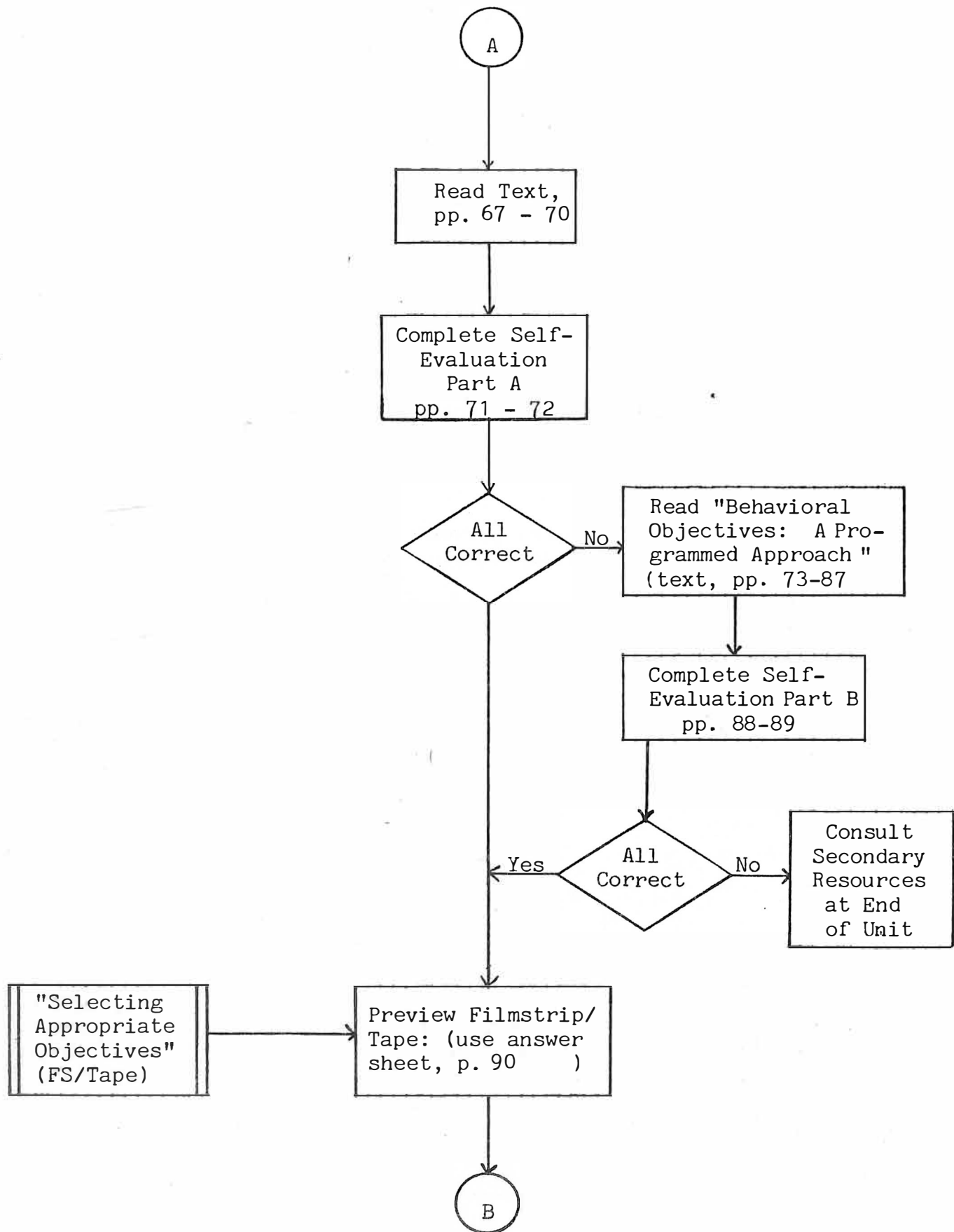
## BEHAVIORAL OBJECTIVES

### Instructional Objectives:

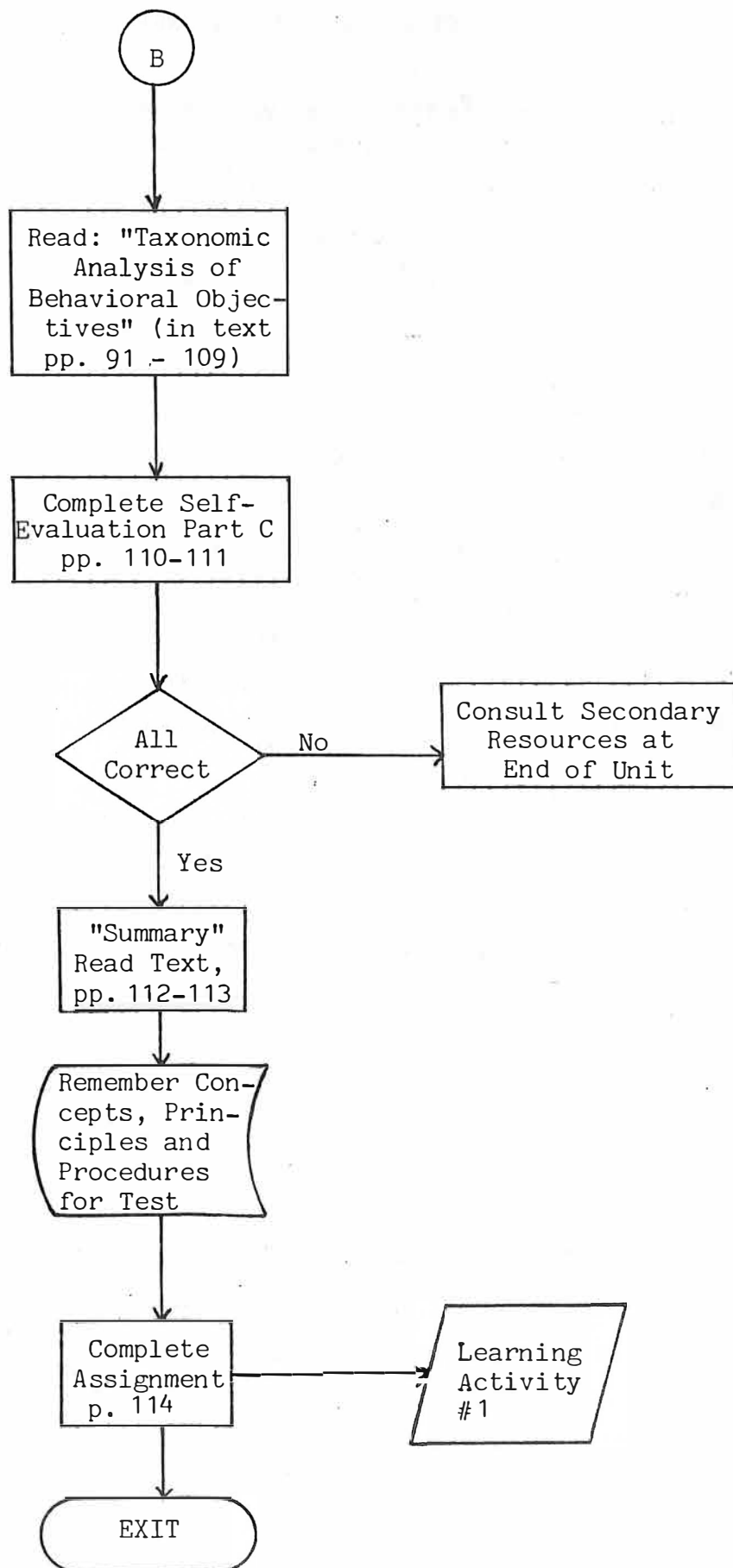
1. Be able to distinguish between educational goals and behavioral objectives.
2. Given a properly stated objective, be able to identify the terminal behavior, the conditions of behavior, and the criteria of performance.
3. Be able to accurately distinguish between written objectives stated in terms of student behavior and those which are not so stated.
4. Given a list of verbs, be able to classify them as behavioral or non-behavioral with 95% accuracy.
5. Be able to convert non-behavioral objectives to objectives which adequately describe post-instruction student behavior (observable, measurable).
6. Be able to state the purpose of objectives and why they must be stated in behavioral terms.
7. Be able to correctly distinguish between written objectives representing the cognitive, affective and psychomotor domains of student behavior.
8. Write behavioral objectives, including all of the following components:
  - measurable terminal behavior
  - conditions of performance
  - criteria of performance
9. Be able to state and discuss at least two instructional implications of behavioral objectives. These implications may consist of rationale, advantages, or disadvantages.

### Task Sequence:









## EDUCATIONAL OBJECTIVE ANSWER SHEET

Use this sheet with the filmstrip/tape presentation "Educational Objectives".  
Circle or write answers when instructed to do so.

1. Yes No
2. Yes No
3. Yes No
4. A B
5. A B C D
6. A B C D
7. A B
8. A B
9. A B
10. A B
11. A B
12. Yes No

Modified Objective (one)

Modified Objective (two)

Modified Objective (three)

## BEHAVIORAL OBJECTIVES\*

Learning is measured by observing student performance. That is the only way a teacher can be sure that learning has taken place, that the student has learned the intended material. This simple maxim engenders several complex issues, however. Only a couple of these will be considered. Both deal with an analysis of what learning really is.

The educational technology field is traditionally premised on the theories espoused by behavioral psychologists, the most notable contributions having been made by B. F. Skinner. These theories describe learning as a mechanistic process that can result from practice (repetition of an act until it is naturalized) or by reinforcement (rewarding the learner for proper behavior, withholding for improper behavior). Learning is said to constitute these acts or performances. The only way to learn, according to behavioral psychology, is to behave, to engage in some overt performance, be it mental or physical.

Multiplication can only be learned by redundantly practicing the times tables, or by being rewarded for performing the correct algorithms. While this analysis of S - R (stimulus - response) behaviorism is simplistic (see unit on Programmed Instruction for more detail), it raises a critical point: learning is behavior, according to the theory.

Contemporary psychologists, who embrace a more cognitive outlook, refute this behavioral theory in what is known as the learning - performance distinction. Their contention is straight-forward: it is fatuous to assume that learning cannot occur without some observable performance, that covert mental processes do not occur. More than ample evidence exists to support this latter position. Humans perform a myriad of higher order mental processes (concept learning, problem solving, evaluation) without any observable behavior.

Your reading of this information represents covert mental processing. You may apply information assimilated from your reading in some behavioral form, but the perception and storage of that information in the brain is a

\* For our purposes, the terms behavioral objectives, terminal objectives, instructional objectives, and learning objectives shall be used synonymously.

covert function. So, learning can and does occur without performance. Learning, as a mental process may or may not involve some observable behavior.

Educational technologists appropriately enough take a mediated view of this distinction. Accepting that mental processes are unobservable, they are faced with the problem of evaluating unobservable performance. How do you know if a student has learned something. The answer is simple . . . through performance. The student must in some observable way manifest learning in some form. This behavior is an indicator that learning has occurred. It can be observed, measured, and evaluated. The behavior though, is only a demonstration of learning. As a teacher, you are asking how can the student prove to me that he/she has learned something. Here is where behavioral objectives enter.

Objectives are alternatively called behavioral objectives, learning objectives, instructional objectives, and so they all, for our purposes, do the same thing; they specify the details of the performance that you as a teacher will require of students to indicate that they have learned something, which is specified by the curriculum or by your own needs assessment. If the students perform this action, under the conditions you specify and to the criteria that you specify, you are in effect certifying that they know or understand some content. Beware, though. The performance is only an indicator of understanding.

One of the primary objections to objectives raised by humanists is that they breed uniformity and stifle creativity. All the students must perform the same thing in the same way. Objectives don't breed uniformity, the teacher does. Instructional programs can be individualized by writing objectives individually for students based upon their ability or needs. A sequence of objectives can be stated and the student placed at his/her appropriate level, to work at their own pace. More recently, the concept of domain referencing of behavior has become popular. The teacher specifies a domain of behaviors that indicate learning, and the student may fulfill one or all to satisfy the teacher. This seems an inherently more reasonable system, as it is only logical that a myriad of performances could indicate knowledge. There may occur situations, however, when uniformity of ability is desirable. In order to insure the ability to safely operate a car on the streets, there exists a set of competencies, as stated in objectives, that each student should be able to perform in a driver education class. Uniformity of skill is desirable in some instances.

However, if you use instructional or behavioral objectives, bear in mind that they are only indicators, instructional tools that can be used by the teacher to systematically develop learning. They are not the end product; learning is. They are merely means to facilitate that goal.

#### Characteristics of Objectives:

1. State terminal behavior in observable, measurable terms, normally consisting of an action verb.
2. State conditions (givens, restrictions) under which the terminal behavior is to be exhibited.
3. State the criteria or standards (% correct, minimal quantity, etc.) by which the behavior will be evaluated.

#### Advantages of Using Objectives:

1. Facilitates selection of appropriate learning activities. One of the most useful concepts in designing instruction is that of appropriate practice, that is, providing the student practice on a specific skill that has been stated as a goal. The best way to learn to shoot foul shots in basketball is to practice shooting foul shots. The behavior stated in the objective simply describes the nature of the practice activity. If the student is expected to solve algebra problems as a terminal behavior, then provide practice at solving those problems.
2. Selects evaluation procedures. Your objective is your test. Objective referenced testing is premised on the belief that the behavior stated in the objective should constitute the evaluation procedure. At the very least, it should function as the model for construction of test problems.
3. Provides feedback for teacher and student. Both the student and teacher at all times know where the student stands with respect to completing requirements (objectives). The student knows when he/she has completed those requirements and the teacher has a referent to gauge student progress by at any time.
4. Improves quality of goals. The performances required by a student as stated in the objective provides a measure of the meaningfulness and appropriateness of goals as stated in the curriculum.
5. An egalitarian procedure. The use of objectives obviates any hidden agenda or unstated expectations by the teacher. The student knows exactly what is expected of him/her. In evaluation, teachers often require learning or behavior that was not previously stated. With the use of objectives, students have a stated agenda that can be used to protect their interests.

### Disadvantages:

1. Using objectives as end, not means. Many teachers who adopt the use of objectives assume they are the end product, that is, the behavior becomes the goal. Objectives are merely instructional tools, indicators that a particular goal has been accomplished.
2. Standardization. For any given instructional goal, several means of demonstrating accomplishment are probably available, that is there are usually several ways that a student can show that he/she has learned something. Requiring all students to complete the same objectives may not be appropriate. It is easy to individualize though by selecting from a list of available objectives or writing individual objectives for each student.

### Principles of Utilization:

1. Objectives should be stated prior to instruction. Students should know what is expected of them prior to beginning.
2. Objectives should be public, that is they should be in writing and disseminated to all involved. Awareness of expectations requires public knowledge.
3. Instructional objectives, and their implications, should be understood completely by each student prior to beginning the learning process. Feedback should be solicited from the student before beginning. This may be in the form of a pretest (if all students can perform objective, why teach it), needs assessment, or informal discussion.

## Self-Evaluation\*

### Part A:

1. The following verbs might be used in writing behavioral objectives concerning the testing of geography. Which verb would require the least clarification in a behavioral objective?
  - A. understand
  - B. learn
  - C. locate
  - D. identify

2. The "behavioral" aspect of a behavioral objective specifies
  - A. teacher behavior
  - B. pupil behavior
  - C. behavioral conditions
  - D. measurement of behavior

From each of the following groups of objectives select the one objective which is most nearly stated in behavioral terms.

3.
  - A. to teach the students how to build a 3 x 5 inch jewel box . . .
  - B. The student will learn the principles of constructing small boxes . . .
  - C. Each 10th grade shop student will build a 3 x 5 inch jewel box . . .
  - D. To show 10th grade students the proper way to construct a 3 x 5 inch box . . .
4.
  - A. To learn the names of the different latitudes of . . .
  - B. To write on an outline map the names of the different latitudes of . . .
  - C. To know the names of the different latitudes of . . .
  - D. To remember how to identify the different latitudes of . . .

From each of the following groups of behavioral objectives select the one that most accurately describes the desired behaviors.

5.
  - A. Locate ten major oceans, bays and straits on an outline map.
  - B. Identify ten major oceans, bays and straits on an outline map.
  - C. Write the names of ten major oceans, bays and straits on an outline map.
  - D. Be able to recognize ten major oceans, bays and straits on an outline map.

From each of the following groups of statements select the one which most clearly specifies acceptable criteria of performance.

6.
  - A. To write a topic sentence suitable for three given related sentences.
  - B. To write a good topic sentence without error.
  - C. To write accurately a topic sentence in 3 minutes.
  - D. To write a sentence for any topic.

\*Developed at Teaching Research, Oregon State System of Higher Education, Monmouth, Oregon.

From each of the following groups of statements select those which describe a condition under which an objective is to be measured.

7. A. Must be able to identify cones, cylinders, and prisms.  
 B. Given a set of geometric shapes.  
 C. Within a period of 30 minutes with less than 3 errors.  
 D. Students in a 10th grade geometry class.

Each of the following statements is a part of a behavioral objective. For each statement select the answer which best describes what the statement refers to in the objective.

8. . . . within a period of 20 minutes . . .  
 A. audience  
 B. behavior  
 C. condition  
 D. criteria
9. . . . given a set of carpenters tools . . .  
 A. audience  
 B. behavior  
 C. condition  
 D. criteria

5. a or c  
 4. b  
 3. c  
 2. b  
 1. c  
 6. b or c  
 7. b  
 8. d  
 9. c

ANSWERS:



## BEHAVIORAL OBJECTIVES

### A Programmed Approach

Please follow directions exactly as given. Do not set your own reading pattern. If the instructions tell you to turn the page, please turn the page.

TURN TO THE NEXT PAGE

If you are reading this material, you have not followed directions. Go back and read again the information at the top of this page.

(The work presented or reported herein was performed pursuant to a grant (OEG-3-7-703729-4512) from the U. S. Office of Education, Department of Health, Education, and Welfare. All work under this grant is done in conformity with the requirements of regulations entitled Grant Terms and Conditions.)

Carlisle Area School District  
623 West Penn Street  
Carlisle, Pennsylvania

## BEHAVIORAL OBJECTIVES

### A Programmed Approach

Recently questions have been raised about the meaning of the term behavioral objective. It seems to the Title III staff that the most direct answer is by demonstration. Three behavioral objectives have been selected for you. You will learn by doing. After you have followed the programmed sequence which is given below, you will be able to perform the following tasks:

1. Given a list of objectives, you will select, with 100% accuracy, those objectives which are written behaviorally and you will not select those written nonbehaviorally.
2. Given a choice of definitions of verbs, you will correctly choose the most concrete, most specific definitions of a given word.
3. You will complete this program (without pulling out your hair!) by learning to use concrete terms that make it possible for you to observe with 100% accuracy that which you want to observe. This has especial force in respect to the verbs used in objectives, as will be further explained (page 81).

Please pause and ponder.

You have just read three behavioral objectives. They specify three things we want you to be able to do. You will know usually when you can do them. We can tell by testing when you can do them (i.e., when you have reached or fulfilled a behavioral objective). We have added a skill to your total behavior. It is observable, measurable, concrete to both learner and teacher.

If you do not have any questions --

TURN THE PAGE

You have a question.

The phrase concrete terms refers to the selection of verbs which are valuable because they tell you exactly how you can observe accomplishment of an objective by an individual, or give you definite directions to follow so you can do what is asked of you to do.

TURN THE PAGE

Now for a trial run:

In the space below, write what you think the following objective means.

THE STUDENT WILL UNDERSTAND THE PURPOSE OF THIS PROGRAM.

Did you write anything:

If you know exactly what was meant --

TURN TO THE NEXT PAGE

If you had trouble deciding what was meant, or you believe it could mean many things, the following selected synonyms for the word understand will complete the process of confusing you:

grasp	get	digest	conclude
comprehend	follow	apperceive	judge
apprehend	figure out	perceive	infer
seize	assimilate	discern	master
penetrate	decipher	realize	take in

Confused? TURN THE PAGE

Check, in the spaces provided immediately following the statements, your selection of descriptive remarks that would indicate to you that a student understands the objectives of this program.

1. His face lights up. \_\_\_\_\_
2. He comprehends the objectives. \_\_\_\_\_
3. He perceives the objectives. \_\_\_\_\_
4. He can grasp the objectives. \_\_\_\_\_

If none of the above really indicates understanding, use the same directions and read the following.

1. The student will select, with 100% accuracy, behaviorally written objectives when he has completed this workbook. \_\_\_\_\_
2. The student will define selected words used in this workbook in a teacher-prepared examination, the acceptable error range being 0: All answers must be correct. \_\_\_\_\_
3. The student will select 5 verbs which denote observable actions for evaluation purposes. \_\_\_\_\_

A check of these statements indicates that you are beginning to differentiate between a behavioral objective and a nonbehavioral objective.

TURN TO THE NEXT PAGE

Let's try this exercise.

1. Do you believe that it is the school's job to require students to be able to do something better than they could do it before they were exposed to instructions?

Yes or No (Circle one)

2. If you answered yes, how do you select students who have improved? (Write a brief answer)

3. Observation of mental development is a major function of teaching. Which of the following objectives - A or B - could be more easily observed, and which assignment do you think would be completed in a manner acceptable to a teacher?

Objective A

To examine the executive and judicial branches of our government.

Objective B

The student shall write a list of jurisdictional limitations of all of our federal courts both constitutional and legislative. This listing shall be based on the expressed limitations as purveyed in Article III of the United States Constitution and shall include all such limitations.

If you selected B, TURN TO THE NEXT PAGE.

If you selected A, TURN TO PAGE 79.

You were correct. Objective B tells a student what he is supposed to do, and the teacher can evaluate the student's work with a predetermined, expected amount of work.

Are these objectives written so that you would know what to do?

1. Make a searching analysis of the concepts underlying democracy.
- A 2. Demonstrate your knowledge of the nature of federal government, its rise, present status, and possible trends in the future.

- or -

Do these give you a better idea of what you are supposed to do or supposed to teach?

1. The student shall correctly define: expressed powers, implied powers, state decisions, and the supremacy of constitutional law over other forms of law.
- B 2. The student shall prepare a chart which will include a decision, its effective date and its implication to demonstrate the concept: "The Supreme Court's jurisdiction is concurrent, appellate, and original."

If you selected Group A, TURN TO PAGE 80.

If you selected Group B, TURN TO PAGE 81.

You were wrong to select A. "To examine the executive and judicial branches" could mean any of the following:

Look at (as under a microscope)

Glance at something

Read something

Write something

Memorize something

Take something apart

Objective B told the student to do a special thing and when he has finished, the teacher will have an observable product to evaluate.

TURN BACK TO PAGE 77 AND TRY AGAIN

You said that you would know what to do when told to make a searching analysis of the concepts underlying democracy.

1. How many pages do you think would be acceptable to the teacher? \_\_\_\_\_
2. Should the search be done in the textbooks? \_\_\_\_\_ In books in the library? \_\_\_\_\_ How many books? \_\_\_\_\_
3. How many concepts do you think the teacher wants? \_\_\_\_\_

Can you determine when the rise of the federal government started and when it ended, or is it still rising? If it had a present status, what materials would you read to write a paper on this subject?

PLEASE RETURN TO PAGE 74 AND READ THE MATERIAL AGAIN



Correct again! It is really not very hard to select objectives which can be evaluated. If you have followed all directions, the fact that you are reading this page means you have acquired the skill of differentiating between an objective which describes an observable product and one that gives you very few, if any directions.

As mentioned on page 74 , we are concerned with verbs in a very FUNDAMENTAL way. A verb is a part of speech that suggests action. Which group, A or B, suggest actions which you can observe:

<u>Column A</u>	<u>Column B</u>
select	understand
name	know
identify	appreciate
solve	learn
compare	grasp
construct	comprehend
distinguish	digest
order	perceive
translate	realize
memorize	decipher
list	relate
write	

If you selected Column A, GO TO PAGE 83 .

If you selected Column B, GO TO PAGE 82 .

We are hung up again. How are you going to decide that a student understands, knows, or appreciates, or that he has learned?

Could it be that:

1. his face will light up?
2. he can write something?
3. he can solve an equation?
4. he can translate French into English?
5. he can memorize?

PLEASE RETURN TO PAGE 74 AND READ IT AGAIN.

Column A is the correct choice, because verbs, as words of action, can define for you what a student should do to demonstrate that he has achieved a desired competency.

A behavioral objective is a statement that tells the student what to do. suggests how to do it, tells him what he should do it with, and at least suggests why he should do it. A behavioral objective tells the observer what it is the student is trying to do, the manner in which he is trying to do it, and the materials he uses to do it.

The following elements provide the standards for a behavioral objective:

1. Who? . . . . . The student
2. What will he do? . . . . . will write a summary of the factors leading to World War I,
3. What material is to be used? . . . using data from the text-book, class discussion, and student-selected reference materials,
4. Who initiates the action? . . . in a form or style as requested by the teacher.
5. What are acceptable responses? . . The summary shall contain not less than five factors,
6. Are there special restrictions or requirements . . . . . of which three factors shall have been taken from the materials presented in class. Two factors may represent the student's summary of other factors which may have contributed

A behavioral objective is an attempt to define clearly and to identify the successful completion of an objective. We are trying to answer the question, "What will a student be like if he goes through the curriculum of the Carlisle schools?" To this end, we are defining the performance standards we expect each student to achieve as he progresses through a given course, and we are further specifying the perceptible behavioral change we expect of that student as he passes through a given sequence. You are now able to pick out behavioral objectives that are correctly written.

## EVALUATION OF OBJECTIVES

Select from the following two objectives the one that is a behavioral objective -- that is to say, the statement that tells you what to do, how to do it, and with what materials.

- A. Develop an appreciation of good music.
- B. Given a selection of 20 records, the student shall select 5 records composed by Bach and 5 records composed by Irving Berlin. The student shall select those records from a sequential presentation of all 20 selections given by the teacher. An error range of 0 is required.

If you selected B, you have met the requirements of our first behavioral objective stated for this program.

TURN TO NEXT PAGE

If you selected A, go back to the beginning of the program and do it all again.

From the following list, select 5 verbs which convey action which you could observe as student behavior (i.e., you can either see him doing the action, or it will produce a result you can observe and evaluate).

select

compute

translate

recite

recall

list

write

construct

solve

name

If you selected any 5 of the above list, you have achieved objective number 3 and are behaving in the manner prescribed by this program.

TURN TO THE NEXT PAGE

If you did not select 5 of these, go back to the first page and go through the book again.

A behavioral objective can best be defined by the following statement or statements. (Check all, none, or as many of the following statements that you believe would help to define a behavioral objective).

1. A behavioral objective suggests what should happen to the learner as a result of instruction. \_\_\_\_\_
2. A behavioral objective is specific in that it adequately describes what a teacher is trying to do. \_\_\_\_\_
3. A behavioral objective tells a student what is expected of him/her. \_\_\_\_\_
4. A behavioral objective suggests to the teacher that observation is important and that the teacher must be sure that the student has achieved the objective. \_\_\_\_\_

If you checked one or all of these statements, you have achieved objective number 2. Congratulations! You have completed the program and may progress to the second program which will do the same job for the question "What is the cognitive and affective taxonomy?"

If you did not check any of these, go back to page 74 and start again and select additional materials for supplemental reading from the listing on pages 115-116.

## Self-Evaluation\*

### Part B:

1. The following verbs might be used in writing a behavioral objective for teaching high school English. Which verb would require the least clarification of a behavioral objective?
  - A. write
  - B. appreciate
  - C. illustrate
  - D. summarize
2. The "conditions" of a behavioral objective specify
  - A. the setting in which the students' behavior is to occur
  - B. the actions which the teacher will observe
  - C. the actions of the leader
  - D. criteria for measuring the student behavior'

From each of the following groups of objectives select the one objective which is most nearly stated in behavioral terms.

3.
  - A. To remember the names of the ten provinces of Canada in such a way as to . . .
  - B. To learn and remember the names of the ten provinces of Canada . . .
  - C. To name and label the ten provinces of Canada on a blank map showing only . . .
  - D. To appreciate the importance of the ten provinces of Canada . . .
4.
  - A. To teach the fundamentals of diagraming electrical circuits . . .
  - B. To learn the fundamentals of diagraming electrical circuits . . .
  - C. To diagram an electric circuit with all the fundamentals . . .
  - D. To know how to diagram an electrical circuit.

From each of the following groups of behavioral objectives select the one that most accurately describes the desired behaviors.

5.
  - A. To send a four-word message by Morse code with a blink light.
  - B. To send a Morse code message.
  - C. To send a message with a blink light.
  - D. To send a message using a code.

From each of the following groups of statements select the one which most clearly specifies acceptable criteria of performance.

6.
  - A. To obtain a score of 50% on a final test for the course.
  - B. Get a score of 50 or more on a 100 item final.
  - C. Score better than at least half the class on the final test in this course.
  - D. Must be able to answer correctly at least 50% of the items on a 100 question true-false test.

\*Developed at Teaching Research, Oregon State System of Higher Education, Monmouth, Oregon.



From each of the following groups of statements select those which describe a condition under which an objective is to be measured.

7. A. Without the aid of references.  
 B. 33 correct out of a possible 50.  
 C. 9th grade geography students.  
 D. Select the proper location of major rivers.

Each of the following statements is a part of a behavioral objective. For each statement select the answer which best describes what the statement refers to in the objective.

8. . . . the first year college geography class . . .  
 A. Audience  
 B. Behavior  
 C. Condition  
 D. Degree
9. . . . without the use of references . . .  
 A. Audience  
 B. Behavior  
 C. Condition  
 D. Degree

ANSWERS:  
 1. a  
 2. a  
 3. c  
 4. c  
 5. a  
 6. d  
 7. a  
 8. a  
 9. c

# SELECTING APPROPRIATE EDUCATIONAL OBJECTIVES

## ANSWER SHEET

1. A B Neither
2. A B
3. A B Neither
4. A B
5. A B Neither
6. A B
7. A B Neither
8. A B Neither
9. A B

10. C = Cognitive

A = Affective

P = Psychomotor

\_\_\_\_(a) \_\_\_\_ (c)

\_\_\_\_(b) \_\_\_\_ (d)

11. C A P
12. C A P
13. C A P
14. C A P
15. L H (L = Lowest,  
H = Highest)
16. L H
17. L H
18. L H
19. C (L or H) A P
20. C (L or H) A P
21. C (L or H) A P
22. C (L or H) A P

TAXONOMIC ANALYSIS OF  
BEHAVIORAL OBJECTIVES:  
AN INSTRUCTIONAL PROGRAM

The following is an instructional program designed to enable you to develop a specified set of skills. It employs a variety of programming techniques, all of which include specific instructions. You will be required to make responses throughout the program.

The first part requires that you read each frame, beginning with number one, and fill in the correct response in the blank space(s) within each frame. Completing the response is important, so write it in. You should check the correctness of each response to the left of the next numbered frame, found at the same level on the next page. Then proceed by completing the next numbered frame, and so on.

The second part is also not completed in the normal page sequence. Following the presentation of information (greater length than the first part), you will be required to respond to a question by turning to a specified page. Do so. All necessary information and directions will be found on that page. In all cases, read and follow the directions carefully.

1. A taxonomy is the study of the general principles of scientific classification. Plants and animals are classified in a \_\_\_\_\_.

5. Classify,  
taxonomic  
analysis

6. If the taxonomy we developed was ordered according to its degree of difficulty, it would be a \_\_\_\_\_.

10. domains

11. Each domain describes a type of activity in which the human organism participates. A t\_\_\_\_\_ a\_\_\_\_\_ would classify and order these behaviors according to their difficulty.

15. affective

16. Classification and ordering of behaviors that show feelings and attitudes would be in the \_\_\_\_\_.

20. affective  
domain

21. A taxonomic analysis of physical coordination skills would yield the \_\_\_\_\_ domain.

25. behavior,  
behavioral

26. Classroom behavioral objectives should be written in all three \_\_\_\_\_.  
A taxonomic analysis will help the teacher do this. -92-

1. taxonomy	2. Taxonomies are orderly schemes that _____ _____ plants and animals according to their natural relationships.
6. hierarchy	7. Human behavior, (the way we respond to stimuli from each other or from our environment), can be classified hierarchically into a _____ _____.
11. taxonomic analysis	12. Our intellectual, (thinking, problem solving, recall) behavior is classified by the cogni- tive domain. The type of behavior present when a young pupil answers the question "2+2=" would be in the _____ domain.
16. affective domain	17. Motor skills involve muscular movement that is involuntarily commanded by the brain. Walking, jumping, catching a ball are motor behavior and are classified in the psychomotor _____.
21. psychomotor	22. In the course of a school day, students will learn behaviors from all domains. Therefore, teachers should classify various behaviors into the appropriate _____.
26. domains	27. If the teacher intended students to write cer- tain sentences, she would just write a b _____ _____ o _____ from the _____ _____ domain. -93-

2. classify

3. A taxonomic analysis is another term for a classification scheme. If we want to classify behavioral objectives, we would use a taxonomic \_\_\_\_\_.

7. taxonomy

8. Humans are complicated. They are capable of producing a variety of responses to various stimuli. In order to classify these different kinds of behavior, we would need more than one t \_\_\_\_\_.

12. cognitive

13. A domain is a \_\_\_\_\_ of human behavior.

17. domain

18. Psychomotor skills are mental and physical requiring the development of coordination. Typing is a \_\_\_\_\_ skill.

22. taxonomy

23. In order to specify the kind of behavior expected of each student, the teacher should use behavioral objectives and classify them into the proper d \_\_\_\_\_.

27. behavioral objective, cognitive

28. A behavioral objective requiring typing skills to be mastered would specify p \_\_\_\_\_ behavior.

3. analysis	4. Taxonomies classify phenomena in a hierarchy, i.e., an arrangement in a graded series from least important to most, least developed to most complex, and so on. A taxonomy of animals from a one-celled animal to the human would be in a _____.
8. Taxonomy	9. These taxonomies are called domains of human behavior. They are ordered, like plants and animals, according to their difficulty or complexity. They are h_____s.
13. Taxonomy	14. Comprehending school lessons would be in the cognitive _____.
18. Psychomotor	19. Mental (knowledge) skills are classified in the _____ domain.
23. Domain	24. Behavioral objectives specify the type of terminal behavior expected of the student. A particular objective may be in the cognitive, affective or _____ domain.
28. Psychomotor	29. The cognitive domain helps us c_____ cognitive behavior, so we are able to write more meaningful behavioral _____.

4. Hierarchy

5. In order to c\_\_\_\_\_ things into the  
schemes, we would conduct a t\_\_\_\_\_  
a\_\_\_\_\_.

TURN TO FRAME 6, PAGE 92

9. hierarchies

10. There are three taxonomies of human behavior.  
These taxonomies are called \_\_\_\_\_.

TURN TO FRAME 11, PAGE 92

14. domain

15. A persons feelings, values and attitudes are  
part of the affective domain. A student who  
likes math problems is exhibiting \_\_\_\_\_  
\_\_\_\_\_ behavior

TURN TO FRAME 16, PAGE 92

19. cognitive

20. Attitudinal feelings are classified in the  
\_\_\_\_\_.

TURN TO FRAME 21, PAGE 92

24. psychomotor

25. In order to specify the terminal \_\_\_\_\_  
\_\_\_\_\_ expected of the student, the teacher  
should use \_\_\_\_\_ objectives.

TURN TO FRAME 26, PAGE 92

29. classify,  
objectives

30. The affective domain is a t\_\_\_\_\_  
of affective behaviors ordered in a h\_\_\_\_\_  
\_\_\_\_\_.

TURN TO PAGE 97



30. taxonomy,  
hierarchy

The remainder of this program is in a different format. At the end of each presentation, you will be given alternative answers to a question directing you to different pages. You do not read all of the pages in numerical order. Follow directions for the most efficient learning. Begin reading below.

#### COGNITIVE DOMAIN

The cognitive domain represents intellectual, thinking behaviors. Most learning that occurs in schools is cognitive. Any behavior requiring the student to recall, comprehend, problem solve, and respond verbally (oral or written) is cognitive behavior. Below is listed a taxonomy of the cognitive domain from lowest level behavior to the highest (hierarchical) developed by Benjamin Bloom and others.

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation

1. Knowledge: Knowledge level behavior required only rote memory and recall of facts, principles, terminology, etc. Objectives written on the knowledge level normally require the student to "name, list, state, identify, or select." Complex ideas that are only recited still fall in the knowledge level. It is probable that many students are able to regurgitate difficult concepts without understanding them. Such behavior is on the knowledge level.
2. Comprehension: Comprehension implies elementary use of knowledge items, such as translation (paraphrasing, retelling, or language translation), interpretation (summarization) or extrapolation (extending information for inferring or predicting). Comprehension shows understanding of information.
3. Application: In order to apply knowledge, you must first know it (Level 1) and comprehend it (Level 2). You then can abstract from the knowledge in the form of rules or generalizations and use (apply) those abstractions in various concrete or abstract learning situations.
4. Analysis: Analysis entails breaking a whole idea down into its component parts, analyzing the elements of an idea, the relationships between those elements, or the organizational principles on which that idea is based, i.e., the structure of the idea. Analyzing is crucial to problem solving and other higher level cognitive tasks.
5. Synthesis: Knowledge that has been broken down into its component parts can be reassembled to form a new whole (if the ideas are reassembled to produce the same idea, it is only analysis behavior, not a higher level one). A unique communication has been synthesized from the old. A new operational plan or set of relationships derived from the old is said to be synthesis.
6. Evaluation: Evaluation is the highest level cognitive behavior and presupposes the completion of all lower level tasks on a body of knowledge, that is, you can't evaluate an idea unless you're able to comprehend, apply, analyze, and synthesize that idea. If you can, you're able to make judgments based upon internal evidence (logical accuracy and consistency) or external criteria (commonly accepted measures or references).

Consider the following question and answer by turning to the page number listed beside the answer you feel is best.

On what level of the cognitive domain (the highest level of behavior required) is the following objective?

The student will state at least two applications of Boyle's Law.

KNOWLEDGE

TURN TO PAGE 101

APPLICATION

TURN TO PAGE 99

Answers to the exercise on affective domain on page 104

1. 2      2. 5      3. 1      4. 3      5. 2

If you missed any, proceed to page 106.

---

If you arrived here from page 106, the answers are:

1. 4      2. 2

If you missed either question, return to page 100 and begin again. If you answered both correctly, proceed below.

---

#### PSYCHOMOTOR DOMAIN

The psychomotor domain categorizes physical motor behaviors. All physical activity from a reflective knee jerk to pole vaulting require coordination of bodily physical movements (motor actions). This coordination is a mental function. The body's movements are directed through the central nervous system. The degree of coordination with which physical (motor) tasks are accomplished is indicative of a person's psychomotor ability. Forming a letter "B" with a pencil or balancing on a beam are complicated, trying tasks for a mentally impaired or very young child. The types of psychomotor objectives required of students and the degree of proficiency (level of taxonomy) should be consistent with their degree of physical development. Psychomotor objectives should supplement most areas of instruction, not just physical education. Constructing objects of miming are psychomotor activities that could supplement diverse lessons in all areas of study.

The levels of the psychomotor domain are listed below with brief descriptions and examples based on learning to type.

1. IMITATION: Crude, imperfect form; imitation by impulse or overt repetition (hunt-and-peck system of one-finger typing)
  2. MANIPULATION: Development of skill in following directions (learning touch-type system, using both hands)
  3. PRECISION: Reproduction, control, errors reduced to a minimum (developed proficiency at typing, using the touch-type system, with few errors)
  4. ARTICULATION: Performance involves accuracy and control plus elements of speed and time (no errors)
  5. NATURALIZATION: Performance becomes natural and smooth (super-secretary)
- 

Most learning of psychomotor skills begin at which stage:

IMITATION

TURN TO PAGE 102

MANIPULATION

TURN TO PAGE 105

Nice try, but . . . . If you analyzed the objective, you would have determined that the terminal behavior required the student only to state (repeat) the applications of Boyle's Law. This information could be acquired from a text, the information memorized and recalled for testing purposes. Complex ideas can be memorized and restated without any understanding of the concept. Consider the type of behavior required in the objective. You may think you're writing higher level objectives, when in fact, you are requiring only low level behavior.

If this is unclear, return to page 97, reread the definitions of each taxonomic level, and try the question again. If you now understand, proceed to page 101.

Answers to Exercise on Cognitive Domain on page 101 (due to the ambiguity of the English language and the lack of detail stated in the objectives some may have more than an acceptable answer, depending upon how you interpreted some words): Your answer should not, in any case, vary more than one level.

- |      |      |      |           |      |
|------|------|------|-----------|------|
| 1. 6 | 3. 5 | 5. 2 | 7. 2      | 9. 3 |
| 2. 1 | 4. 3 | 6. 1 | 8. 2 or 4 |      |

If you missed any, proceed to page 108.

If you arrived here from page 108 the answers are:

- |      |      |      |
|------|------|------|
| 1. 3 | 2. 1 | 3. 4 |
|------|------|------|

If you missed any, return to page 97 and begin again. If you answered all correctly, proceed below.

#### AFFECTIVE DOMAIN\*

The affective domain classified the levels of valuing behaviors, those dealing with a person's attitudes or feelings. These are not as specifically stated as cognitive objectives, since they describe values or feelings, which can't be as easily quantified. Affective objectives are important even though more difficult to write. Without proper attitudes, student performance will suffer. Determining affective objectives and strategies to meet those objectives are necessary to achievement of your educational goals. Below are listed the levels of affective behavior with brief descriptions and examples of objectives on each level.

1. RECEIVING - Student sensitized to the existence of a phenomenon or stimuli; willing to receive or attend to them.
  - a. Given an opportunity, the student will develop an awareness of variety of sounds and their depth and quality by listening to the following:  
iron pot, china cup, tin foil.
  - b. When working on a committee appointed for the purpose of making a model of the human ear, the student listens carefully to the ideas of his fellow committeeman, as to how they feel the project should best be carried out.
2. RESPONDING - Actively attending through some form of participation; the student is committing himself in a small way to the phenomenon involved.
  - a. Given the opportunity, the student will voluntarily do a written research project, such as finding out how bats "hear."
  - b. Given the opportunity, the child voluntarily accepts responsibility for developing and carrying through a check list for proper teeth care.
  - c. When given a free reading period, the student will select a science area and show his enjoyment by voluntarily discussing some part of his reading with the teacher.
3. VALUING - Event has value to student and he treats it as a belief with a positive attitude.
  - a. Given an opportunity, the student will have expressed belief that the scientific method is of value in studying the body.
  - b. Given an opportunity, the student brings into the classroom material to involve others in sound experience.
  - c. Upon observation, the student's beliefs are expressed by his actions.
4. ORGANIZATION - As student encounters situations for which more than one value is relevant, he organized the values into systems, determining interrelationships, identifying dominant ones.
  - a. Using his understanding of the scientific method of investigation, the student will be able to compare his findings for a science project with those of a classmate and determine what caused his report to be different.
  - b. Given the opportunity, the student will develop a plan for utilization of his free study time in class so that he is able to complete extra assignments.
5. CHARACTERIZATION BY A VALUE OR VALUE CONCEPT - Values have a permanent place in the individual; student consistently acts in accordance with the values he accepts and this behavior becomes part of his personality.
  - a. Given an opportunity, the student will be willing to accept another person's findings on a project, revise his own findings on the basis of it, and change his behavior to encompass this new knowledge.

\* David R. Krathwohl, et al. Taxonomy of Educational Objectives: Affective Domain. New York: McKay, 1964.

On which level of the affective domain is the following objective written?

Given the opportunity, the student will design and produce a slide presentation summarizing his attitudes about local school rules to be used to convince teachers and administrators of the need for change.

RECEIVING  
RESPONDING  
ORGANIZATION

GO BACK TO TOP OF PAGE 100  
TURN TO PAGE 103  
TURN TO PAGE 104

You're absolute correct. The behavior called for was a knowledge level task. Now try this exercise.

Directions: Next to each behavioral objective below check the category in which it belongs. If an objective belongs in more than one category, check the highest one.

Clue: First, identify the terminal behavior (decide what is expected of the student).

COGNITIVE DOMAIN  
Key to Categories

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation

	1	2	3	4	5	6
1. Given an unknown contemporary piece of music, the student will write an essay on the quality of the orchestration.						
2. List the following local community organizations for health maintenance and improvement.						
3. To write an original fable using the moral of one of Aesop's fables.						
4. To be able to pronounce ten new sight words which follow the rule on silent O . . . . .						
5. To answer questions on information presented in bar, circle, and line graphs in Chapter 10 of book.						
6. To list the following functions of scientific theory and experiment in modern life.						
7. To tell in one's own words, a story read in the reader, including the 4-5 main events in correct chronological order.						
8. Given a description of interaction between child and parent or teacher and student, give an operant definition and interpretation, given the following, discriminative stimuli, response, reinforcers used.						
9. To choose the best titles or summary statement for a paragraph at 10th grade reading level.						

Right. Learners begin by imitating behavior they see and then practicing to develop proficiency (higher level skills). Now, try these exercises.

---

Directions: Check the highest level into which these objectives can be classified.

PSYCHOMOTOR DOMAIN

1. Imitation
2. Manipulation
3. Precision
4. Articulation
5. Naturalization

1. The student will type a one-page letter with no mistakes within five minutes.
2. Given two consecutive demonstrations by the teacher, the student will reproduce the two dance steps shown.
3. The student will demonstrate his abilities with a hammer by driving two dozen nails into practice boards.
4. Using the Fosbury Flop style, the student will seek a world's record in the high jump.
5. The student in first grade will be able to print all of the upper case letters of the alphabet to resemble the standard form.

1	2	3	4	5

TURN TO PAGE 109

No. Responding entails only active attention to external stimuli presented by someone else. The student commits himself only in a small way to the idea involved. The objective, as stated, requires a major commitment to change, supported by a strong set of values organized into a presentation. With less than full commitment, the presentation would never be completed, or if completed, would never be shown.

If this is not clear, return to page 100, reread the definitions of the various taxonomic levels and try the question again. If you now understand the distinction between levels, proceed to page 104.

Absolutely correct. This type of behavior would require the learner to organize his values into a concept before beginning to produce such a presentation. Now, try the exercises.

Directions: Check the highest level into which each of the following objectives could be classified.

#### AFFECTIVE DOMAIN

1. Receiving
2. Responding
3. Valuing
4. Organization
5. Characterization by a Value or Value Concept

1. During free study hall periods, the student will engage in research on zoology.
2. In the face of superior logical arguments during a debate, the student will accept the viewpoint of the opposition, using it to explain phenomena formerly subsumed by his own premises.
3. During a play presented in the auditorium, the students will sit quietly, listening carefully to the delivery of the lines.
4. Given the opportunity, the student will demonstrate his belief of the Bahai faith.
5. Subsequent to the unit on the Civil War, the student will complete extra reading on topics of their choice relating to the Civil War.

	1	2	3	4	5

TURN TO PAGE 98.



I'm afraid not. Most people, especially young children, learn new behaviors (psychomotor and cognitive) by imitation. They see a behavior exhibited, most often by their parents, and begin to imitate it. Manipulation comes only after the learner acquires the behavior and begins to practice it.

NOW, TURN TO PAGE 102

While affective objectives are not as commonly stated as cognitive, they are nevertheless important. Without a proper attitude toward learning, learning will not occur. Affective objectives assist the teacher in determining what learning is important as well as providing feedback on student acceptance of what is being taught.

Let's consider a couple of examples of affective objectives.

---

Example 1:

The student will voluntarily attend a philharmonic concert after school hours.

---

This type of behavior would be idyllic for any music teacher. It is somewhat difficult to classify because we don't know what really motivates the student to attend the concert. We can be sure that the student is at the "responding" level, because he is actively attending or participating. If the motivation is not to impress the teacher or to please the parents, the student could be valuing the performance; so the correct answer could be 2 or 3.

---

Example 2:

As a result of the instructional activities, the student will reaffirm his belief in the United States by taking a permanent oath of allegiance.

---

This type of commitment is complete, representing a value concept. It is characteristic of many allegiances to various parties, organizations or government. Consistency of belief occurs at this level.

---

Directions: Check the highest level into which these objectives can be classified (refer to chart on page 100).

1. Given the opportunity, the student will develop and present to class his position on the causes of the economic difficulties.
2. Given the opportunity, the student will complete extra credit exercises in his workload.

1	2	3	4	5	6

CHECK YOUR ANSWERS ON PAGE 98

Psychomotor objectives are particularly useful in teaching primary, kindergarten, or learning disabled children as well as the obvious applications in physical education. Motor coordination tasks also need to be developed for many vocational skills now being taught in public schools or specialized vocational schools. Let's try a couple examples to help you develop the skill of classifying psychomotor objectives.

---

Example 1:

Given a perceptual task, the student will fit the square blocks in the square holes, round blocks into round holes, etc.

---

While this appears to be a simplistic low-level skill to adults, it would appear enigmatic to a mentally retarded or perceptually impaired child. Having no model, the child could not imitate behavior, so this objective would constitute manipulative behavior (levels in the taxonomy described on page 98).

---

Example 2:

The student in masonry class will be able to lay a row of bricks without more than an inch of variance.

---

This objective requires more than simply the manipulative ability to lay bricks on mortar. The criteria of variance implies an element of precision (level 3) but not of speed or perfection, such as higher levels required.

---

Now try these exercises.

Directions: Check the highest level into which these objectives can be classified (refer to chart on page 98).

	1	2	3	4	5	6
1. The student will run the 100-yard dash in under 10 seconds.						
2. After observing the coach, the student will try to pole vault over the bar.						
3. Using a lathe, the student will turn the piece to within .003 inch of tolerance.						

NOW, TURN TO PAGE 109 TO CHECK YOUR ANSWERS.

Since most objectives written for the classroom are cognitive, it is important that you are able to classify these with proficiency. It is also important that you vary the levels of the objectives you write. A steady diet of low level (knowledge) objectives will cause boredom and apathy in students.

Let's analyze a couple objectives.

---

Example 1:

To give an original example (i.e., not one used in reading or class) of the following unconditioned reflex.

---

Clearly, this requires higher than recall (knowledge) behavior. To be able to give an example you must be able to understand (comprehension) what an unconditioned reflex is. Additionally (refer to the original description of each level on page 97) you must abstract from such understanding (application). Examples would constitute concrete forms of such abstractions, so the highest level of behavior exhibited in Example 1 is application, level 3.

---

Example 2:

Given an educational problem in question form, design an experiment to answer the question, using the most appropriate designs available.

---

This objective clearly requires higher level intellectual behavior. You are required to analyze a problem (in question form), presupposing an understanding of the principles and generalizations of the problem. Analyzing the problem entails breaking the question down to determine what the question is getting at. Rather than simply answering the question, you are required to reconstruct the question in a different form (requiring analysis level ability in research design). This process is synthesizing the question into a research design, requiring synthesis level (5) behavior.

---

Now, try a few more exercises.

Directions: Check the highest level into which the following objectives can be classified.

	1	2	3	4	5	6
1. Given a set of theorems, the student will solve ten geometry problems.						
2. The student will state at least three theorems used in the proof.						
3. The student will develop a method for solving geometry problems.						

Answers to Psychomotor Domain exercises on page 102.

1. 4      2. 1      3. 2      4. 5      5. 2

If you missed any, turn to page 107.

---

If you arrived here from page 107, check your answers here.

1. 4      2. 1      3. 3

If you missed any, return to page 98 and begin again. If you answered all correctly, proceed below.

---

### TAXONOMIES APPLIED TO OBJECTIVES

These taxonomies (cognitive, affective, and psychomotor) function as checklists for the writer of behavioral objectives. A few simple rules should be followed when writing objectives:

1. Be specific: When designing instruction, ask yourself, "What observable, measurable performance can the student do to prove to me, as the teacher, that he has learned what I want him to learn?"
2. Write objectives in various domains: There are always more than one way to teach anything. Students learn in different ways that vary developmentally. Young children depend more on psychomotor and less on cognitive abilities for learning (since the latter are not fully developed yet). Provide a variety of methods to learn.
3. Vary the levels of objectives within each domain: Low level objectives, (knowledge, receiving, imitation) are the easiest to write, since they are more clearly identifiable and measurable. A steady diet of them is also the most boring.

The learning process is divided by Gagné into three distinct phases: (1) learning facts, (2) using facts to identify concepts, and finally (3) building relationships among concepts allowing the learner to identify principles and solve problems. This is a shortened alternative to Bloom's taxonomy of cognitive behavior. The student is most challenged by the latter behavior. Objectives should be written to develop this learning sequence, to challenge the student. Knowledge, as an end product is of little usefulness. The greatest variety of experiences should be available to the student to help him learn.

THE END

## Self-Evaluation

### Part C:

1. Check the name(s) of much quoted writers on the subject of taxonomies of behavioral objectives.
  - A. Benjamin Bloom
  - B. Robert F. Mager
  - C. David Krathwohl
  - D. Max Englehart
2. A taxonomy of objectives is a
  - A. cost benefit analysis
  - B. justification of objectives
  - C. research study of school programs
  - D. classification scheme for learning goals
3. Check the three principle classes of objectives.
  - A. knowledge and information
  - B. attitudes and appreciation
  - C. character and mental discipline
  - D. muscular activity and coordination
  - E. extra-sensory perceptions
4. Insert the letter C, A, or P in the blanks to show which domain each of the following learning outcomes belong.

C = Cognitive	_____	Appreciation of poetry
A = Affective	_____	Memory of decimal equivalents
P = Psychomotor	_____	Ideals of fairness
	_____	Skill of typewriting
	_____	Public speaking ability
	_____	Understanding Ohm's Law
	_____	Doing push-ups
5. Check the objective in each set of two that requires the more complex performance level:
  - A. List the foods that provide Vitamin C.
  - B. Plan a week of menus to provide a balanced diet with a variety of foods.
  - A. Design a mathematical game to demonstrate a mathematical relationship.
  - B. Use multiplication combination facts to solve a problem.
  - A. Judge the effectiveness of given political speeches based on these criteria . . . .
  - B. Describe the political events leading up to the War of 1812.
  - A. Write a report using notes and outlines as a basis.
  - B. Analyze given paragraphs for hidden prejudicial statements.

5. (continued)

- A. Explain why the farm population has decreased since 1950.
- B. Propose a plan for helping rural youth adjust to urban life.

Check the validity of your answers by consulting the answer key.

ANSWER KEY: 1. a, c  
2. d  
3. a, b, d  
4. A, C, A, P, C, C, P  
5. b, a, a, a, b

### Summary:

Objectives once again are merely conceptual tools to help the teacher or instructor organize their teaching efforts and communicate to the student their intentions and expectations. As such, it forces both the teacher and the student to be accountable for their performance. Teaching effectiveness and student ability and learning can be measured by the number of extent of objectives accomplished. The use of objectives is also inherently more fair to pupils. At test time, the student is aware of the type of performance that is expected of him/her. There can be no hidden curriculum, or at least none for which the student can ethically be held accountable.

The advantages accruing from the use of instructional objectives are:

1. Selects the appropriate evaluation procedure. Your objectives are your evaluation (objective - referenced test) or at least dictates the nature of the test.
2. Facilitates the selection of instructional materials and methods. Once you understand the type of performance that is expected of the student, selection of methods that provide appropriate practice of that objective is simplified.
3. Provides feedback to the teacher and the student. The student is continuously aware of his/her performance in terms of what is expected. When the objectives have been accomplished to the stated criteria, those expectations have been met. Objectives provide a realizable goal toward which the student can work. Each knows where they stand in relation to that goal.

Additionally the teacher receives feedback on his/her own teaching performance. The degree of student success can be easily measured and compared or otherwise evaluated.



4. Improves instructional goals. Objectives are merely behavioral manifestations of instructional goals; they define the observable product of goals. As such they function merely as operationalized goals, i.e., defining the outcome of any instructional goal. Actually several different objectives may be alternatively used to manifest any given goal. The contention that an instructional goal can only be fulfilled in way is detrimental to the individuality of learners. In fact, a domain of behaviors exists that could accurately reflect accomplishment of a goal. Objectives should be viewed as a measure of accomplishment.

Use objectives judiciously. If used in this manner, they will help to clarify the nature of your instruction to your students (audience) as well as to yourself.

## BEHAVIORAL OBJECTIVES

### Assignment # 1

#### BEHAVIORAL OBJECTIVE

The student will correctly write 5 behavioral objectives (one from each of the 3 domains including one higher level cognitive, and one lower level cognitive, and one of your choice). Each objective will satisfy these criteria:

- a) specification of observable behavior
- b) description of conditions under which the behavior will take place
- c) specification of level of acceptable performance

Each objective must be correctly classified according to domain and level.

(Cut here and attach to assignment when submitted)

#### EVALUATION

Name \_\_\_\_\_

The evaluation will be based on the criteria listed below.

<u>Scale Range</u>	<u>Student Rating</u>	<u>Instructor Rating</u>
0 - 5 Observable behavior	_____	_____
0 - 5 Conditions of performance	_____	_____
0 - 5 Criterion	_____	_____
0 - 5 Domain classification	_____	_____
TOTAL	=====	=====

#### Grading Scheme

18 - 20 = A

16 - 17 = B

14 - 15 = C

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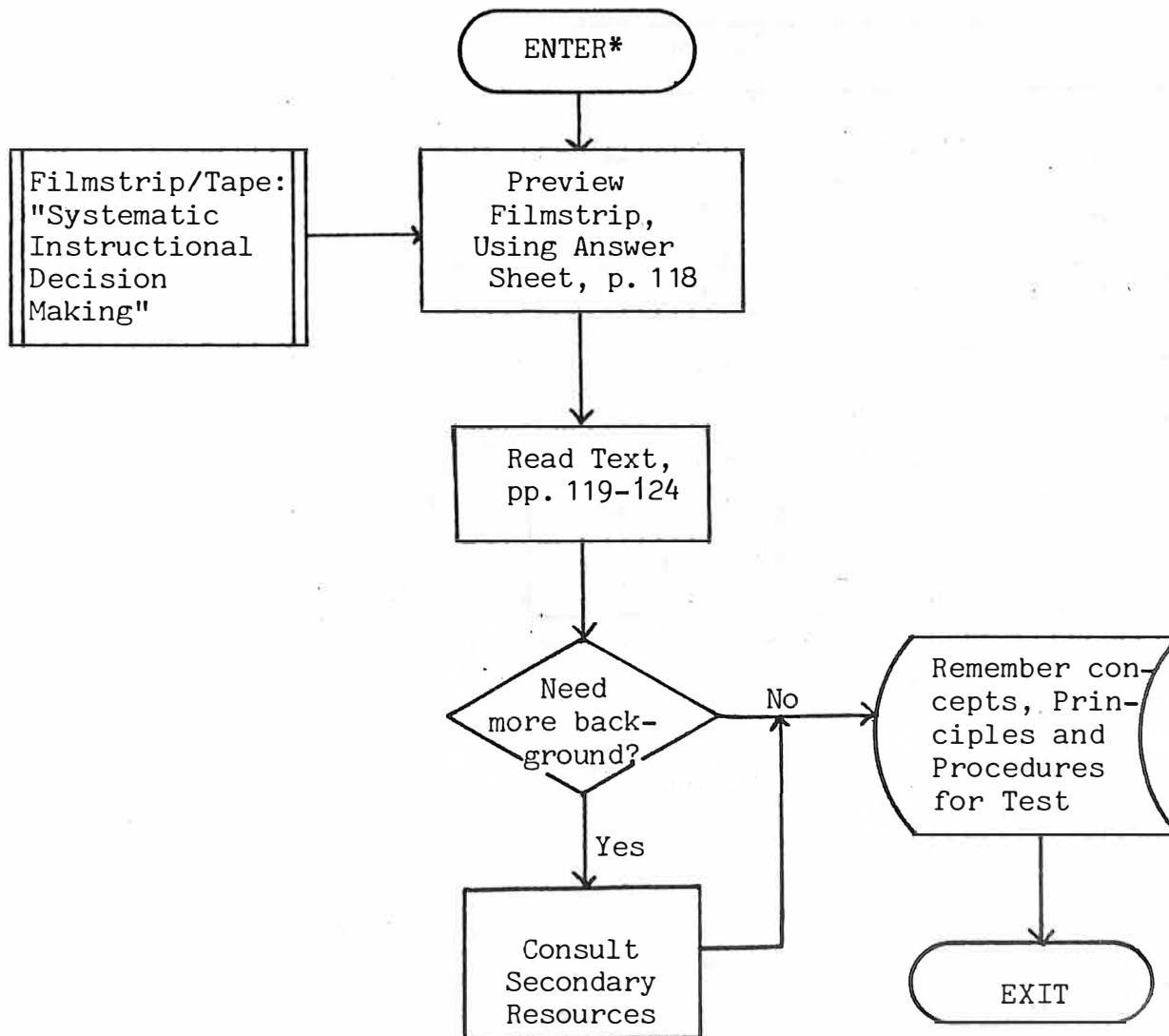
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## SYSTEMS APPROACH

### Instructional Objectives:

1. Using the systems approach, be able to graphically illustrate the instructional design procedure including the major components.
2. Using the systems approach, be able to develop a rationale to the implementation of objectives in instruction.

### Task Sequence:



\* Having read objectives.

SYSTEMATIC INSTRUCTIONAL DECISION-MAKING  
Answer Sheet for Filmstrip/Tape Presentation

1. A B

2. A B

3. A B

4. A B C D

5. \_\_\_\_\_  
\_\_\_\_\_

6. A B

7. A B

8. A B C

9. A B

10. A B

11. ☐ ☐ ☐ ☐

## Systems Approach

The systems approach to instruction has several antecedents (See Figure 1) that have contributed to its development, most of which are somewhat inter-related. The development of computer systems and the study of cybernetics

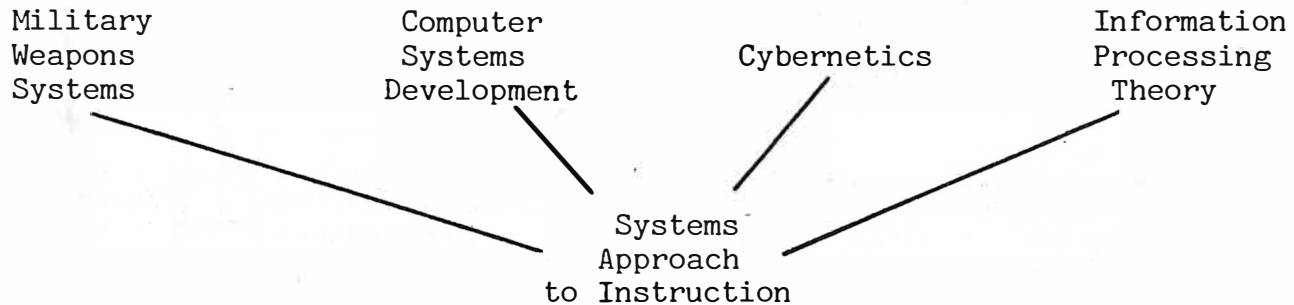


Figure 1.

have probably contributed most directly to its genesis as a methodology for planning instruction. Four primary stages or processes exist for computer systems (See Figure 2) as derived from cybernetic theory. The systems approach to instruction applies these stages to the systematic development of instruction.

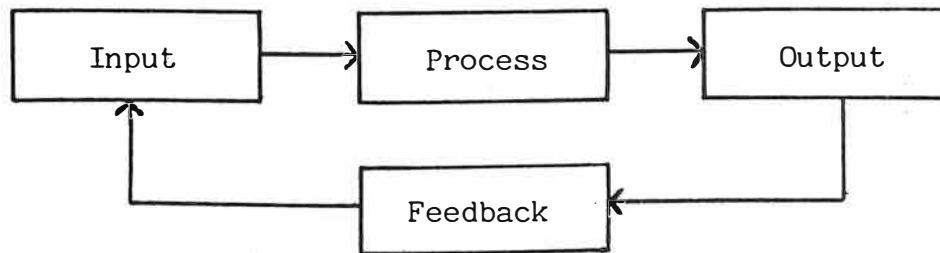


Figure 2.

The input stage entails the definition of instructional components: students, objectives, materials, and so on. In the process stage, these components interact in instructional sequences. In the output stage, the results or student performance is evaluated. These results are then analyzed during the feedback stage for purposes of refining the system.

Tuckman and Edwards have redefined these procedures in three basic stages: the analysis, synthesis, and operation stages (See Figure 3). Their model provides the framework for a course offered in this institution, described in the following article. The procedure described therein includes most of the components or techniques included in any systems model.

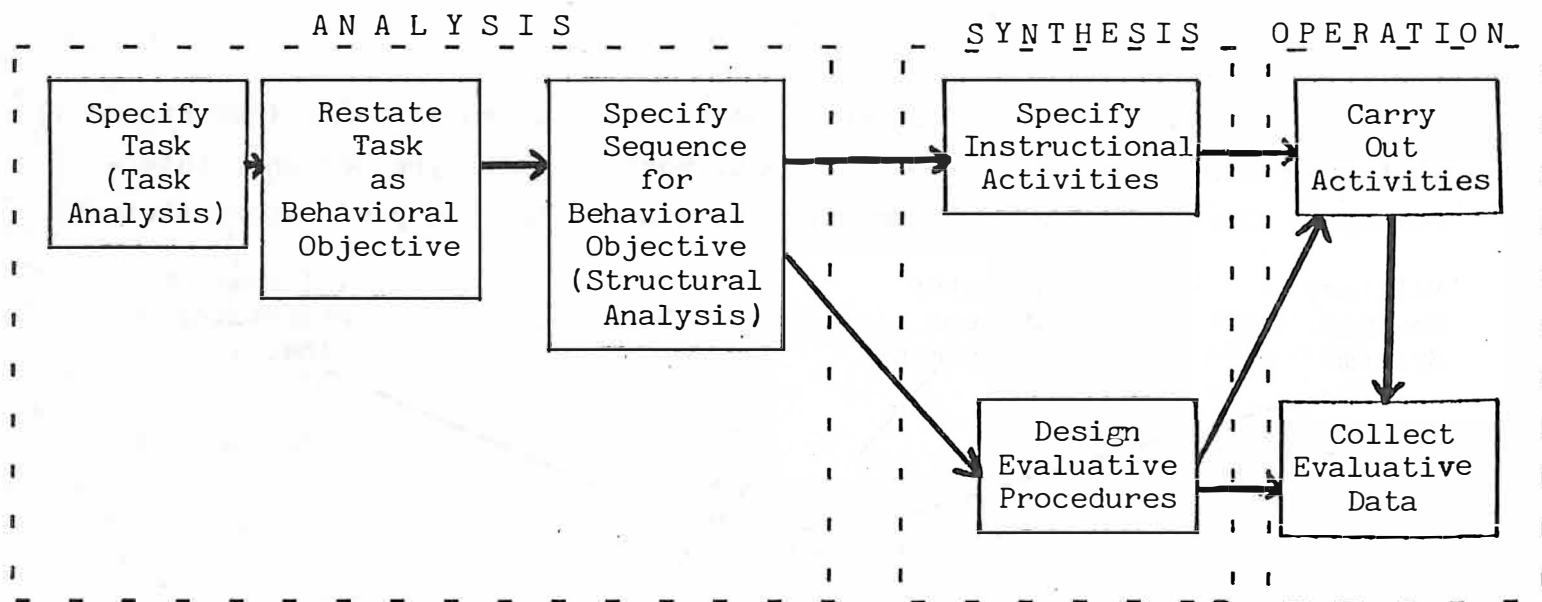


Figure 3. SYSTEMS MODEL FOR INSTRUCTIONAL MANAGEMENT



# Systematic Design of Instruction: A Course Model

David H. Jonassen

The development of competent instructional designers from university coursework depends on the application of systematic principles of instruction. Philosophic consistency between course content (in this case, systematic design of instruction) and instructional methodology (systematically designed instruction) must exist in any course in instructional design. Too often, educational technologists resort to traditional instructional schemes that are at odds with the nature or substance of the course content. These may employ methods that lack the rigor implicit in the model being taught. The course described in this article is taught at the University of North Carolina at Greensboro. The course attempts to apply the fundamental principles of the systems approach to the systematic design of instruction.

## The Model

The systems approach applies cybernetic learning principles to a sequential set of operations. These operations are designed to structure learning system components in a way that will maximize instructional outcomes. The large number of learner, content, and methodological variables confronting the prospective designer tends to complicate the learning design task. Because the instructional systems design process is complex, it is necessary to break it down into subsystems of related components. Three phases in the systems model are prominent: analysis, synthesis, and operation. These phases are characterized by similarities in the functions comprising that phase, thereby constituting the three sections—or subsystems—of this course.

The analysis phase is shown in Figure 1. This consists of a linear sequence of operations that define the purpose and parameters of the system. The designer must determine learning goals, translate those into instructional objectives, analyze and describe learner tasks to be performed, and construct criterion test items to measure attainment of those objectives. These skills require the student to analyze the nature of learning outcomes in their learning system.

The second phase, synthesis, is shown in Figure 2. The learning outcomes defined in the analysis phase provide the basis for determining instructional strategies and procedures in this second phase. The student designer synthesizes instructional procedures from the clear definition of the learning task.

The operational phase, shown in Figure 3, implements the system. Students in the course try out their systems in classrooms or other appropriate instructional settings. They collect data, analyze it, and revise their systems accordingly. This latter phase is optional for the students, depending upon the grade or terminal objectives they contract for in the course.

Implicit in the definition of the systems approach is a process orientation. This is manifested in a sequence of development procedures. The model for this course, and shown in these figures, is oriented by a sequence of development processes. Certain predefined processes contribute to most steps in the sequence. These processes provide the theoretical or procedural basis for the system development step. The processes

were originally conceived outside the context of the systems approach, but they are so appropriately and ubiquitously applied to these development steps that they should be considered an integral part of the model.

Resulting from these development steps are the products of the systems approach: the objectives, task analyses, test items, and so forth that comprise the students' outputs in the course. Each student is expected to develop an instructional unit based on the design principles summarized in the model. This unit must contain the stated products or outcomes of each step in the process. The unit then will define an instructional system developed from and oriented by another instructional system—this course.

## Analysis: Figure 1

1. Enter with Systems Overview. Before beginning the design process, the systems model—with its attendant cybernetic principles and information processing theory—is presented to the students as a context for learning the design skill. This overview session functions as an advanced organizer for subsequent course content. In addition to systems theory, course objectives are recognized and accepted.

2. Instructional Goals. The importance of writing instructional goals is often disdained by systems designers in deference to behavioral objectives. In this step, the curricular purpose for the system is established. In order to help clarify this intent, students analyze their goals according to a curriculum rationale, as described by Popham and Baker. This process, conceived originally by Tyler, is a curriculum decision-making scheme based upon data collected from student needs and interests, social status, and subject matter specialists. The data are

subsequently ranked in a hierarchy based upon the system's philosophy of instruction and a psychology of learning. This rationale is applied to the initial setting of curricular goals.

3. **Instructional Objectives.** The instructional goals are translated into instructional objectives. These contain the three Magerian components of terminal behavior, conditions, and criteria of performance. The importance of efficiently stated objectives has been documented frequently.

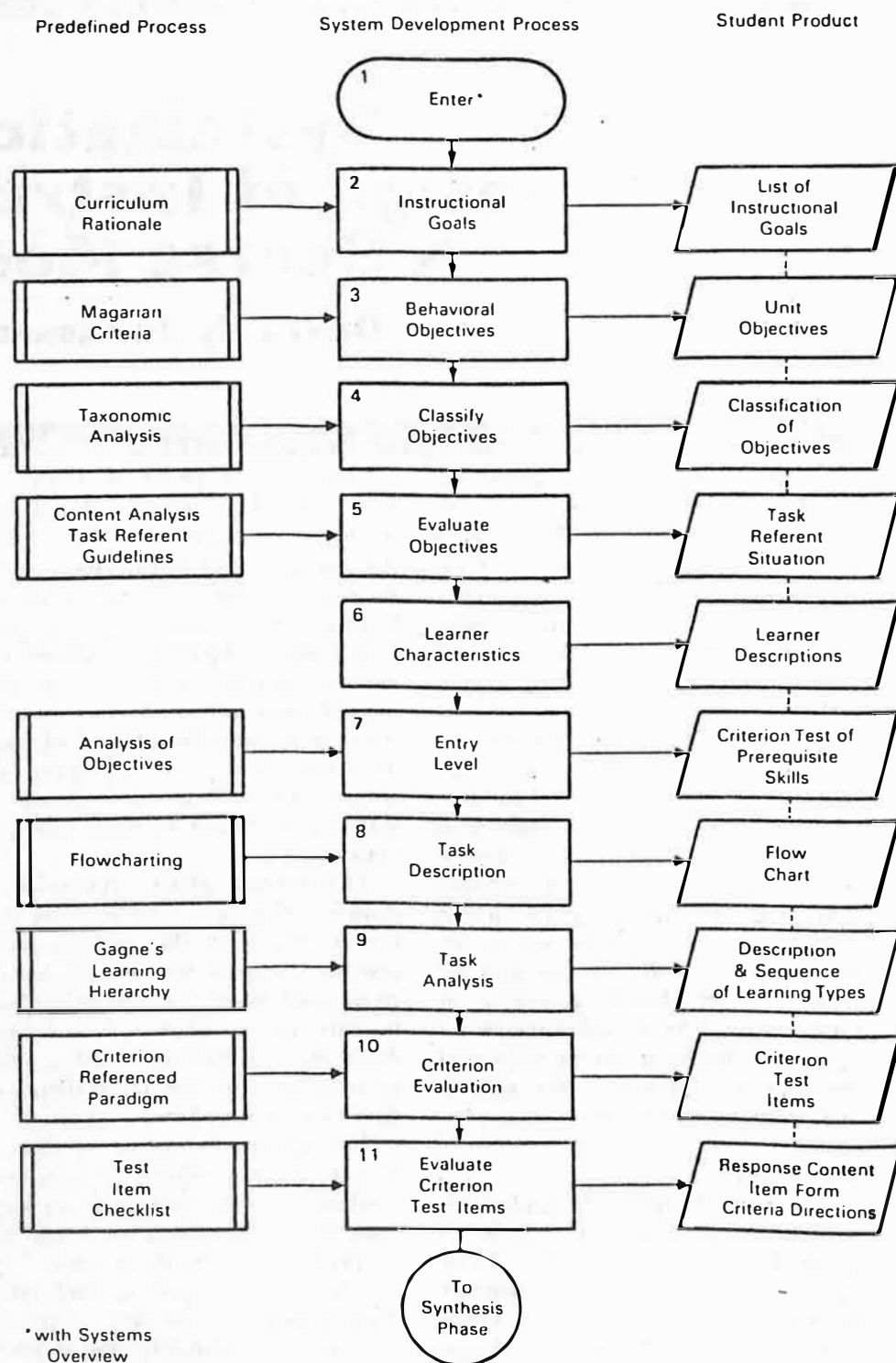
4. **Classify Objectives.** An initial procedure in the analysis of the learning tasks includes classification according to Bloom's taxonomic analysis procedure. The student designer must determine the nature of the task required in the objective by classifying it as cognitive, psychomotor, or affective. Subsequently, he must also classify it according to the level of its respective domain. This classification will later be compared with a determination of type of learning according to Gagne's hierarchy.

5. **Evaluate Objectives.** Two methods of analyzing objectives for relevance that are used in this course include content analysis and the task referent situation test. The former analyzes objectives in terms of the meaningfulness of their content as previously stated in the instructional goals. The latter entails projection of learning of objectives to some future learning task. These relevance checks are intended to prevent the writing of objectives simply as an academic exercise.

6. **Learner Characteristics.** The student designers must analyze and describe the general learner characteristics of the learners for whom they are planning their unit of instruction. Age and grade level, socioeconomic background, intelligence, learning style, and reading ability are a few of the general learning characteristics that become important design variables in subsequent planning steps, such as determining entry level, selection and evaluation, and so on.

7. **Entry Level.** Determination of entry-level skills is distinguished from learner characteristics on the basis of their specificity. Entry-level behavior defines the prerequisite skills needed to complete a unit of instruction. This specification may be used for determining the initial steps in the task description as well as a base level of knowledge. When compared with postunit evaluation, this yields information about the amount of learning. If the designer's unit of instruction is to be individualized, entry level will vary with each student entering the system. Entry level in group instructional procedures dictates prerequisites. The learning design student must produce a criterion instrument to measure any prerequisite entry-level behavior.

Figure 1. Analysis Phase



\*with Systems Overview

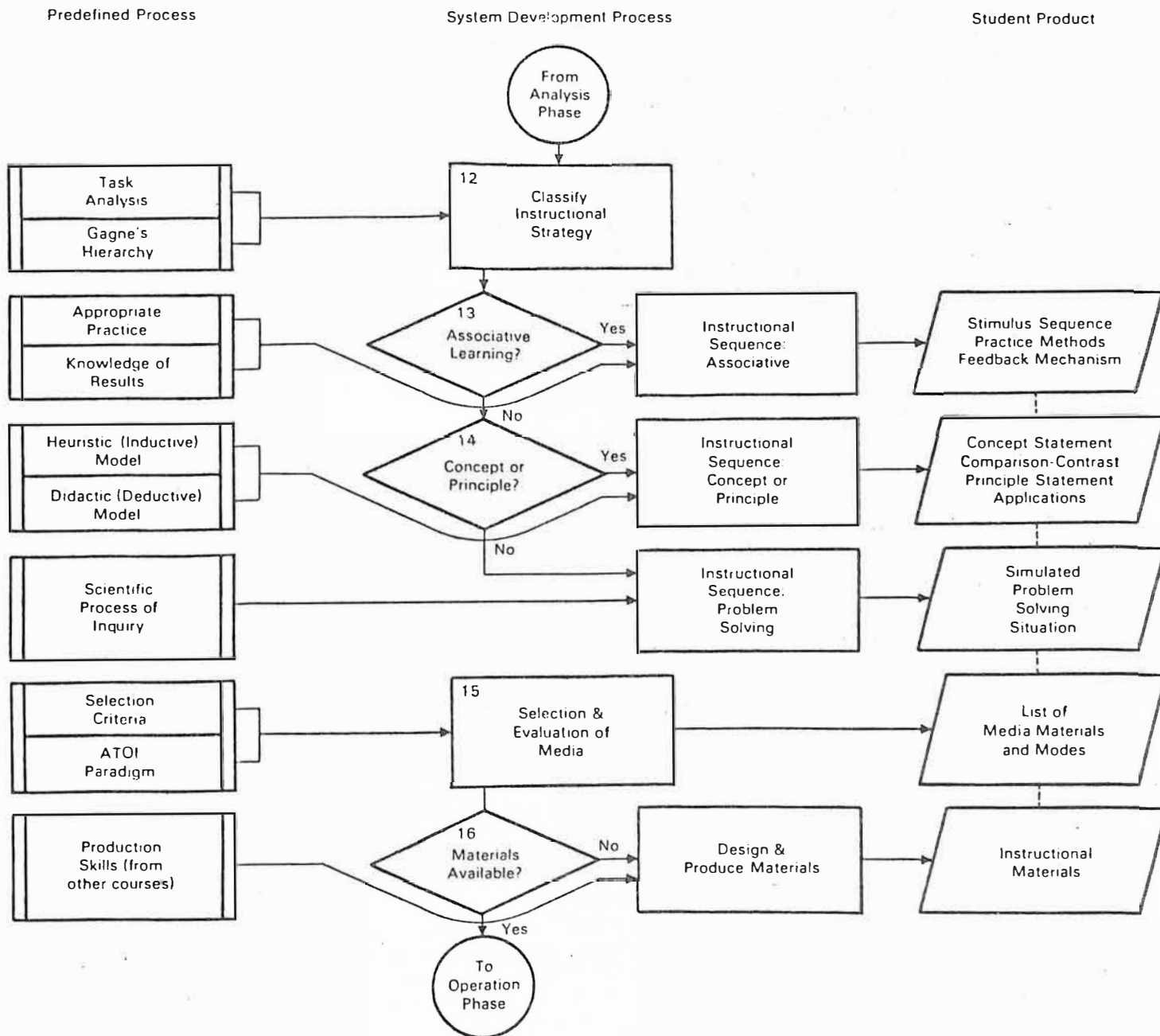
8. **Task Description.** With entry and terminal behaviors specified, the designer must learn to route learners through an appropriate sequence of behaviors from entry level to the terminal performance. This sequence of tasks or task description, as described by Davis, Alexander, and Yelon, uses flowcharts as a form of visual shorthand for describing the specified sequence of tasks. Flowchart symbols and procedures demark this module of course instruction.

9. **Task Analysis.** The task sequence described in the previous step is next subjected to analysis of type of learning.

Using Gagne's hierarchy of learning types, the student designer learns to classify each task in the sequence according to its type of learning. This information will have direct applicability in planning instructional strategies.

10. **Criterion Evaluation.** The student writing criterion tests must consider the many distinctions surrounding evaluation: formative or summative; criterion-referenced or norm-referenced; measurement or evaluation. The conceptual issues are taught to the prospective designers by comparison-contrast. Test construction for their instructional unit as-

Figure 2. Synthesis Phase



sumes the criterion-referenced paradigm. The students must write criterion test items that are as equivalent as possible to the objective. Only this way will they be valid indicators of terminal behavior.

11. Evaluate Test Items. To direct equivalence, students must produce for the course sample test items, including a response description, content limits, item format, criteria, and test directions. The test items are finally analyzed for validity and reliability.

Writing test items concludes the analysis phase of instructional development. By this step, the students have determined what, to whom, and in what sequence they will teach their units. They also have produced indicators of learning.

#### Synthesis: Figure 2

As illustrated in this figure, the syn-

thesis phase is considerably more variable with its decision stops. The variations in determining instructional strategies are determined during the analysis phase. The student designer now synthesizes the parameters defined in the first phase into instructional procedures.

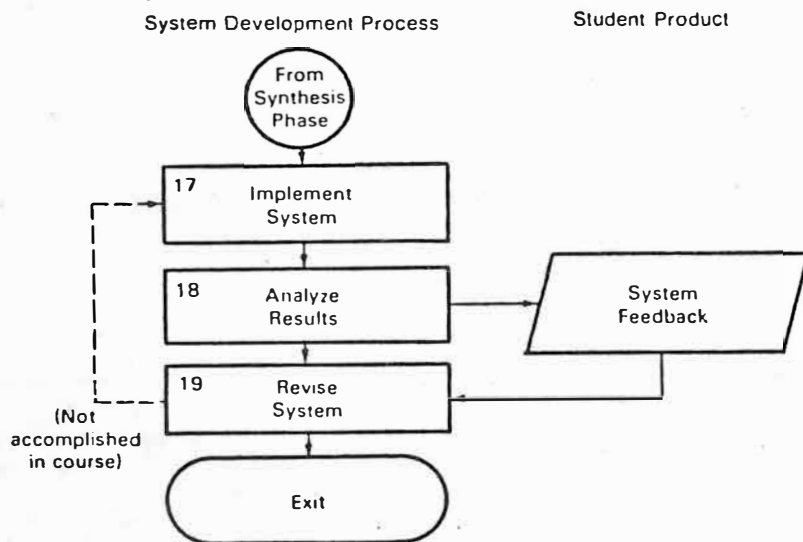
12. Classify Instructional Strategy. Using the task analysis conducted during the analysis phase, the designer next determines the appropriate instructional strategy. For this purpose, Gagne's hierarchy of eight types of learning is abbreviated to three types: associative learning, concepts and principles, and problem solving. Emphasizing the higher level forms of cognitive behavior, these learning types are grouped together based upon similarities in their instructional methodology. The module covering instructional strategies includes a consideration of the effects of preinstructional

strategies, such as advanced organizers and perceived purpose. Time constraints prevent involved analysis and application of these procedures.

13. Instructional Strategy: Associative Learning. If, after reclassifying tasks according to the abbreviated hierarchy, the student determines that a task exemplifies associative learning behavior, an instructional sequence will be developed. This sequence will consist basically of stimulus presentation, practice, and knowledge of results. The sequence is based on the assumption that associate tasks should be taught associatively; i.e., stimulus→response→reinforcement (feedback). The concepts of appropriate practice and knowledge of results are defined by Popham and Baker.

14. Instructional Strategy: Concept or Principle Learning. Concepts and principles consist of the cumulative re-

Figure 3. Operation Phase



relationship of associations and concepts, respectively. They may be taught inductively or deductively, depending upon the nature of the concepts and principles and the general learner characteristics. Objectives for such learning sequences require the learner to be able to state or identify examples applications of specific concepts, principles. Therefore, presentation of comparison-contrast sequences for principles should precede/succeed a statement of the concept or principles for inductive deductive learning sequences. This simplistic generalization of frequently complex teaching methods serves only as a model for determining instructional strategies.

15. Instructional Strategy: Problem Solving. Problem-solving behavior most frequently exemplifies the scientific process of inquiry: problem statement, hypothesis, formulation, testing hypothesis, and evaluation. This procedure serves as a model for problem-solving behavior. The designer needs to develop simulated situations in which the learner can apply the procedure.

16. Selection and Evaluation. Implementation of instructional strategies first depends upon selection and evaluation of the appropriate media of instruction. The strategies prescribed by the design student identify the class of media required for stimulus presentation, practice, and so on. The nature of the content further defines the specific modality required. To this purpose, selection aids assist the learning system designer in delineating choices. These serve only as general models for the selection process. A modification of the aptitude-treatment paradigm is also used to focus on the appropriate instructional medium. Learner characteristics (aptitude), treatment (media characteristics), and objectives (type of learning) are combined into an ATOI (aptitude-treatment-objective-interaction) paradigm for media selection. As sug-

gested by Briggs, this procedure cannot constitute a mechanical rule for determining an intersection of the characteristics. It functions only as a conceptual tool.

17. Material Availability. Once optimum learning strategies and materials are specified and selected, they must be purchased or produced. Design and production skills needed to generate instructional materials are not in the domain of this course.

Instructional specifications from the analysis phase have now been synthesized into instructional procedures and materials. Next, these are implemented and tested for efficacy in the operation phase.

#### Operation: Figure 3

The instructional unit designed in the first two phases must now be validated by the student designer in a realistic instructional setting. This validation process requires the designer to try out the instructional methods, collect data, and analyze the results. The process is an example of formative evaluation or, in the more contemporary design lexicon, learner verification.

18. Implement System. This step and the succeeding ones are optional, based upon the grade a student designer contracts for in this course. Those with higher expectations or commitments will try out their learning systems in an actual classroom or in a simulated learning environment. The materials must be used in the sequence specified during the synthesis phase.

19. Analyze Results. To assess the effectiveness of the system design, criterion test data are compared with entry-level test data and general learner characteristics. As a formative evaluation phase, feedback is generated about the system itself; that is, the results from this invalidated system cannot adequately re-

flect student behavior. Such summative conclusions can only result from a validated system.

20. Revise System. As a concluding exercise, the learning system designer will make specific recommendations about how the system would be revised were it to be reimplemented. Actual revision of design and materials, and subsequent formative procedures, are beyond the scope of the course. Students possessing these competencies may continue refining the system outside the context of the course.

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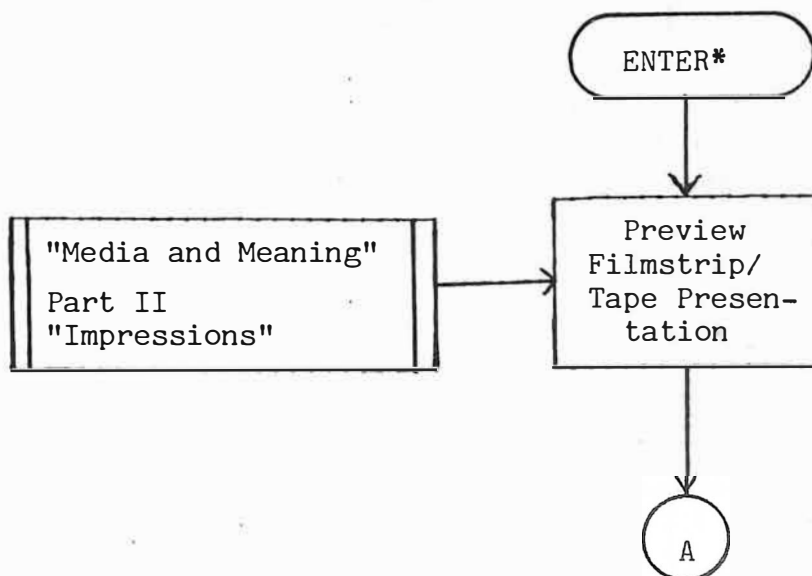
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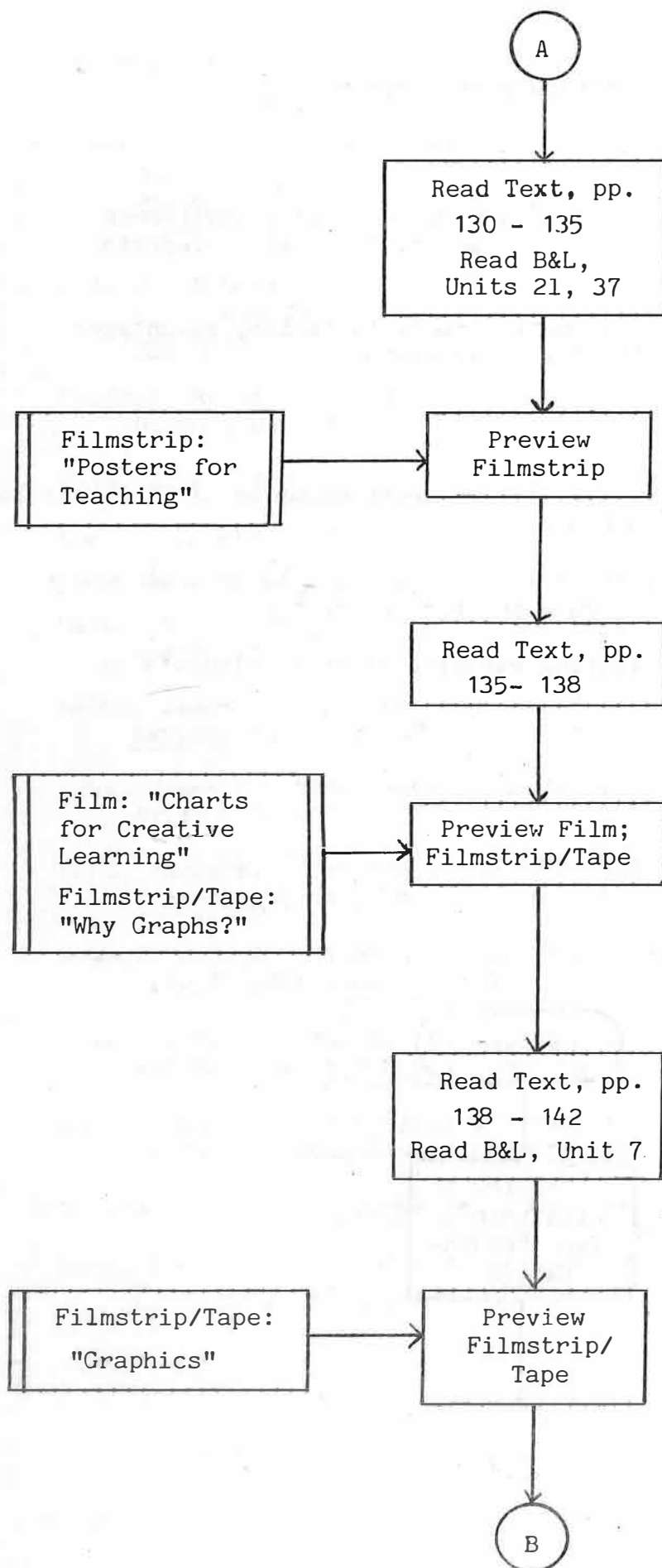
## GRAPHICS AND GRAPHIC PRODUCTION

### Instructional Objectives:

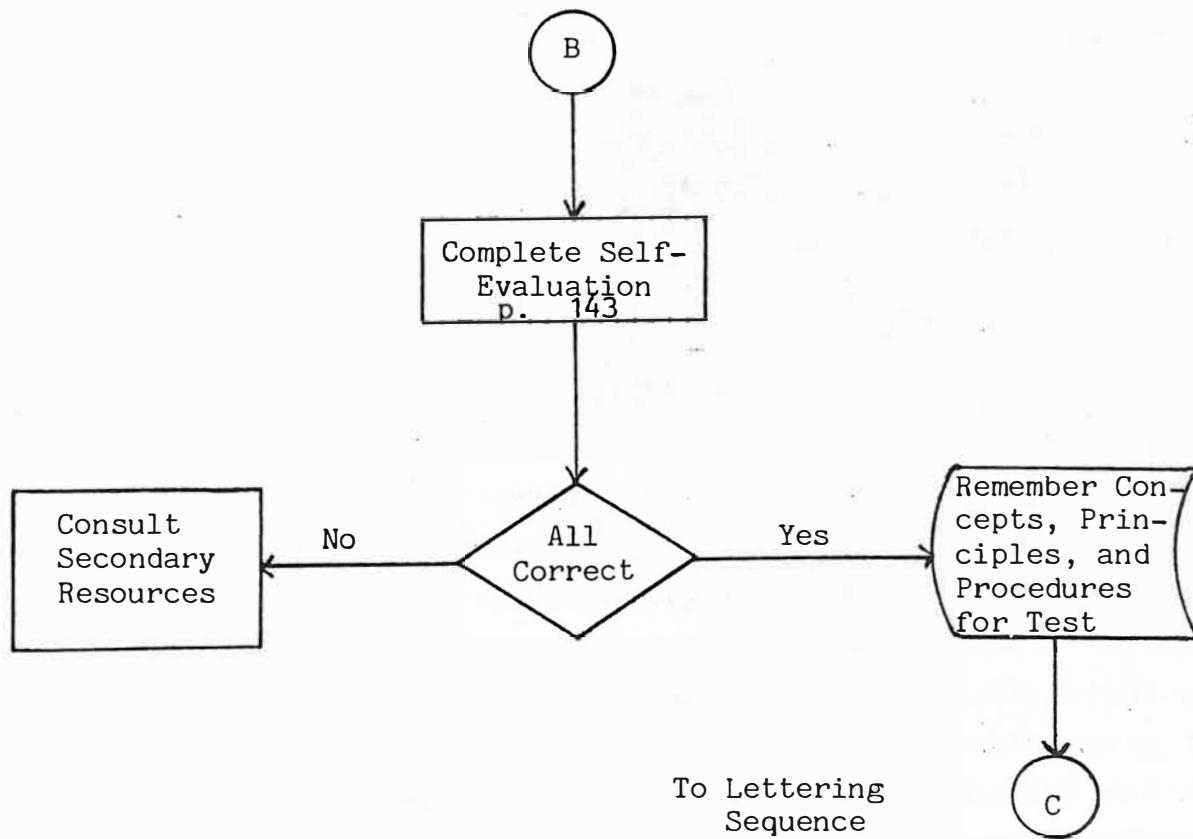
1. Given a visual context encountered in a normal learning environment, be able to define "visual literacy" and describe how it is important in that context.
2. Be able to list at least two fundamental characteristics, advantages and disadvantages of each of the following media:
  - a. posters
  - b. graphs
  - c. charts
3. Given a simple set of data, be able to construct examples of line, circle, and bar graphs to represent that data.
4. Given a theme or a specific instructional objective, be able to design a graphic that adheres to the form principles of design.
5. Be able to construct two conflicting examples of these elements of design:
  - a. line
  - b. shape
  - c. volume
  - d. texture
6. Complete Learning Activities 2,3, and 4.

### Task Sequence:









## GRAPHICS

Graphics are visual. . . anything written, drawn, printed or engraved. Graphic arts, then, refer to any of the applied fine arts, such as painting, drawing, and so on. They are graphic by virtue of their applied nature. In educational technology visuals are used in the production of instructional materials, which are predominately visual.

The idea of visualized instruction in the modern sense dates back to Comenius in the seventeenth century. In what must have been the first truly illustrated textbook (*Orbus Pictus*) Comenius applied the idea of "visual aids" to instruction. Throughout the centuries since then, the "visual" has played an increasingly important role in learning. Used as models to represent abstractions, events, or objects, visuals now occupy the prominent position in modern instructional materials. Gattegno<sup>1</sup> discusses the effects of a visual culture, dominated by television, cinema, and visual persuasive devices, on social and educational practice. The effects of mass communication technology are being felt in education. Students are oriented by mass communication technology, expecting a high degree of visual sophistication in the learning materials they use. The understanding of graphic principles has become essential for anyone interested in producing instructional materials. This unit of instruction is important to most of the units in this text, since almost all types of media use visuals of some form to instruct.

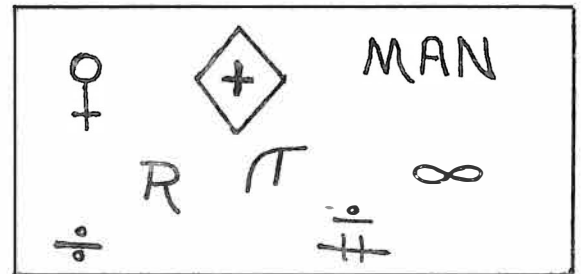
### Characteristics of Graphics:

1. Visual information is transmitted on three levels: the symbolic, representational, and abstract.

- a. Symbolic Level

The use of visual symbols, including letters, to stand for ideas, comprises the language of vision. The verbal language, using visual characters to represent sounds, imputes less meaning to the visual element

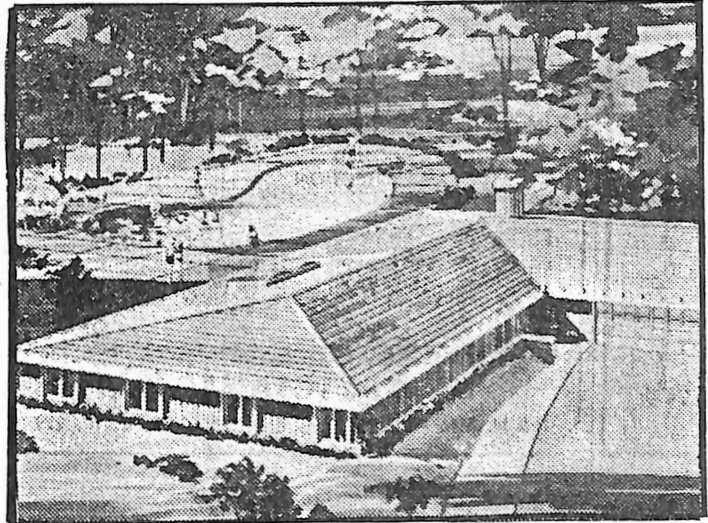
(the letter) itself. Together these symbols are capable of symbolizing an infinite number of ideas, whereas with non-verbal, visual symbols, such as road signs, scientific notation, or ideographic languages, each symbol represents a single idea.



<sup>1</sup>Gattegno, C. *Toward a Visual Culture*.

b. Representational Level

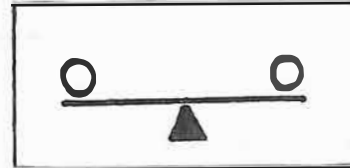
Visual representations of objects or events, such as pictures, are vicarious substitutes for experiencing. This type of illustration is most prominently used in instructional materials to more definitely visualize an idea. A picture of a house is not the same as seeing and experiencing it personally, but is preferable in forming a construct to no referent at all.



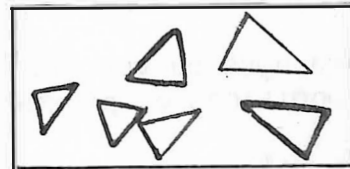
c. Abstract Level

This level of visual information refers to the form of the visual and how it affects meaning. The abstract level is operationalized in certain elements of visual design:

Balance refers to the placement of visual objects in a graphic and their effect on the overall sense of balance in the visual. The size, color, and texture of the objects will effect this balance, brighter, smaller objects tending to counterbalance larger, duller objects.



Unity of idea or form affects the saliency of any visual. It refers to the singularity of theme and form. When all parts of a visual work together, it has unity.



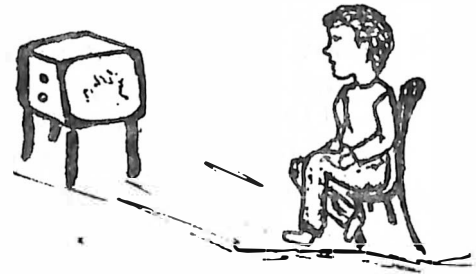
The variable use of long shots, medium shots, and close-ups affect how an object is perceived. For example, long shots do not separate an object from its background or field. This context will add information but reduce the prominence of the object available in a close-up. Television is a close-up medium, establishing intimacy with characters through the use of close angle shots.



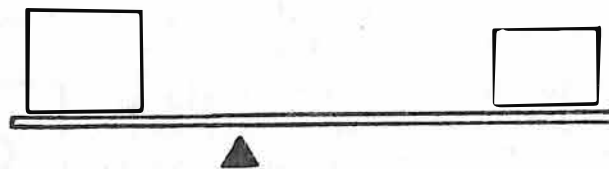
Harmony refers to the ability of objects, shapes, and colors to blend together to form a unified image. Many claim that harmony is best expressed in nature.

These are but a few of the elements of design that affect visualization. A detailed study of these is not within the scope of this course, but rather is usually taught in art courses. Suffice it to say that care should be exercised in the design of visuals for instruction.

2. Visuals present messages to our most highly used and developed sense. Estimates of the amount of learning that occurs visually range as high as 90%. The majority of learning does occur visually.

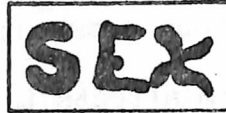


3. Visuals can verify or make more meaningful abstract principals through presenting concrete representations of objects.



Force = distance from  
X mass  
FULCRUM

4. Graphics direct our interest and attention to important features of the object or to the object itself.



5. Graphics convey little or no message unless they are seen. Viewing conditions or presentation techniques should be appropriate.
6. Visuals are more efficient than verbal presentations, because they trigger more cues in a shorter time period. The adage about a picture being worth a thousand words is appropriate. The amount of information that can be transmitted by one picture on many levels is often worth more than a thousand words.
7. Visual stimuli control verbal or psychomotor behavior. When the traffic light changes from red to green, a complex series of behaviors are initiated.
8. The effect of visuals on learning is in part dependent upon some characteristics of human receivers. Humans tend to:
  - a) orient themselves through visual feedback (Ever stumble into an unfamiliar room at night, searching for the light switch?)

8. b) see things in continuous wholes (incomplete objects are closed up)
- c) see what they expect to see (because of previous encounters or preconceptions)
- d) see what they want to see (because of biases or predilections).

#### Advantages of Graphics:

1. Summarize information
2. Teach facts and processes
3. Relate ideas
4. Attract attention
5. May be teacher or student made
6. Materials easily obtained
7. Use variety of materials to produce
8. May be made quickly, inexpensively

#### Disadvantages of Graphics:

1. Stifle creativity by providing too specific or concrete conception of an idea
2. Too frequently present too much information
3. Graphic symbols have different meanings to individuals perceiving them.

#### Utilization Principles:

A review of some of the findings from a voluminous amount of research will be used to summarize utilization principles:

Gropper, George L. Why is a picture worth a thousand words. AV Communication Review, 1963, 7 (4):75-95.

Two basic functions of visuals (in acquisition, retention, and transfer of responses):

- 1) Visuals as cues and reinforcers -- to cue and reinforce response (may not be relevant to the subject)
- 2) Visuals as examples (highly relevant to subject)

What is meant by "A picture is worth a thousand words?"

- 1) Visuals help students acquire, retain, and transfer responses
- 2) Visuals take less time to achieve learning
- 3) Efficiency of instruction is a function of control over conditions under which student responds (visuals have more control)

Gropper, George L. Learning from visuals: Some behavioral considerations. AV Communication Review, 1966, 14 (1):37-69.

Use a visual/verbal order of presentation because:

- 1) Pictorial responding for pictorial learning is easier (for concept learning) than is verbal responding to verbal materials. Since early stages of learning should be deliberately made easy, use visual material first.
- 2) Visual/verbal order preferred, since the integration of words and pictures requires transfer from one to another. Transfer occurs best in this order.

Role of visuals:

- 1) To make concept learning easier
- 2) To facilitate transfer

Dwyer, F. *Guide for Improving Visualized Instruction*. State College, PA: 1972.

Frank Dwyer has dedicated a considerable part of his career to the study of visualized instruction. These conclusions summarize an extensive amount of research.

- 1) The use of visuals specifically designed to complement oral and printed instruction does not automatically improve student achievement. For certain types of educational objectives, oral and printed instruction without visualization is as effective as visually complemented instruction. For other types of educational objectives the use of visuals designed to complement a particular instructional method and to facilitate achievement of a specific educational objective will increase student achievement of that objective.
- 2) All types of visuals are not equally effective in facilitating student achievement of different educational objectives. The type of visual illustration most effective in transmitting information is dependent upon the type of information to be transmitted.
- 3) The method by which students receive their visualized instruction (television, slides, programmed instruction) determines the type of visual that will be most efficient in facilitating student achievement of specific educational objectives. Identical visual illustrations are not equally effective when used for externally paced and self-paced instruction.
- 4) The effectiveness of a particular type of visual in promoting student achievement of a specific educational objective depends on the amount of time students are permitted to interact with the visualized instruction.
- 5) For students in different grade levels, the same visuals are not equally effective in increasing achievement of identical educational objectives.
- 6) For specific students and for specific educational objectives, the use of color in certain types of visuals appears to be an important instructional

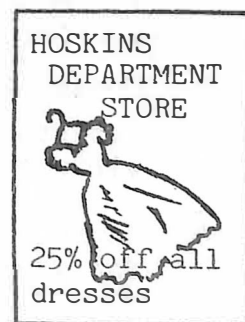
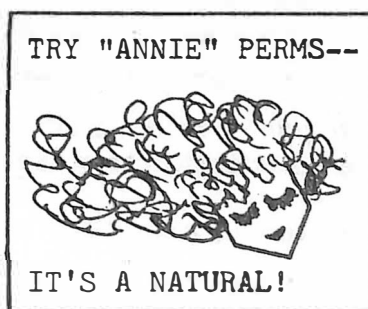
variable in improving student achievement. For other educational objectives however, the added cost of color may not be justified from the instructional effectiveness viewpoint.

- 7) In general, for high school students for whom slides are used to complement oral instruction, differential effects attributed to various visualized treatments on immediate retention tests disappear on delayed retention tests.
- 8) Student perceptions of the value of different types of visual illustrations are not valid assessments of their instructional effectiveness; that is, aesthetically pleasing visuals may be deceptive in the instructional value.
- 9) The realism continuum for visual illustrations is not an effective predictor of learning efficiency for all types of educational objectives when the visualized instruction is presented via television, slides, programmed instruction, and textbook formats. An increase in the amount of realistic detail contained in an illustration will not produce a corresponding increase in the amount of information a student will assimilate from it.
- 10) The use of questions to focus student attention on the relevant visual learning cues in the more realistic illustrations used to complement externally paced and self-paced instruction is not an effective technique for improving the instructional potential of the illustrations.
- 11) Boys and girls in the same grade level (high school) learn equally well from identical types of visual illustrations when they are used to complement oral instruction.
- 12) Identical visual illustrations are not equally effective in facilitating the achievement of students possessing different levels of entering behavior (prior knowledge in a content area).
- 13) Merely increasing the size of instructional illustrations by projecting them on larger viewing areas does not automatically improve their effectiveness in facilitating student achievement.

#### Instructional Applications of Graphics:

As a heading, instructional applications should subsume various types of graphics. So, we shall consider, in order, posters, cartoons, graphs.

#### POSTERS



Posters may be student-produced or commercially available. The latter

tend to have three primary functions:

- a) Decoration - Posters are popular, inexpensive decorative devices, available in gift or book stores in a wide variety of appealing scenes. Creating an exciting and desirable atmosphere in your classroom can only help to stimulate student interest.
- b) Campaigns - The poster seems essential in political campaigns, exposing the candidates face in every conceivable corner of the community. Verbage is limited to a simple command or campaign slogan. Other types of campaigns include safety campaigns or savings and investment campaigns in work places, convincing workers through redundancy of the advisability of a certain course of action. Start your own classroom campaigns to motivate students to read, return library books, or any other desirable behavior.
- c) Advertising - Posters are used extensively in advertising products. Billboards are nothing more than large posters that employ visual techniques to make a sale. "Sesame Street" has proven the instructional value of commercials to "sell" learning. Try it.

#### Characteristics of Posters:

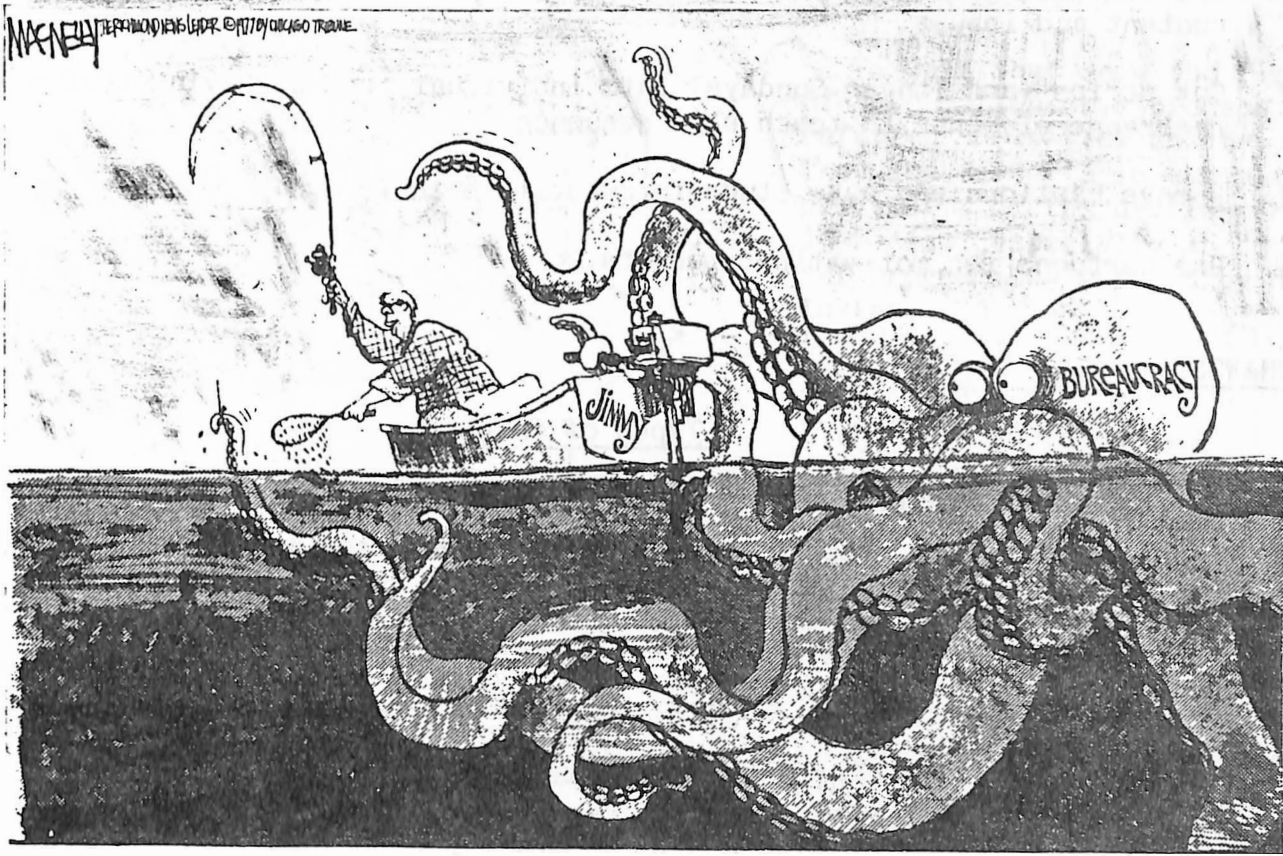
1. Vivid, clear message
2. Little detail
3. Command attention
4. Little verbalization
5. Color usually used effectively
6. Communicate a single idea
7. Eye-catching

#### Utilization Principles:

1. Use posters for:
  - a. Campaigns in class against tooth decay, tardiness, or any other behavior you want to prevent.
  - b. Presenting content.
  - c. Setting a mood. A learning center decorated with a certain type of poster will set the tone for the activities done therein.
  - d. To stimulate imagination.
  - e. To provide visual, vicarious experiences that will show students places or events they'll never be able to see.
  - f. Motivating students toward appropriate behavior.
  - g. Decorating. Classroom should be as inviting and interesting as possible.
2. Change posters periodically to prevent boredom.
3. Let students make posters as unit follow-up activities extolling the virtues of the preceeding activities.
4. Store posters (rolled up) in cardboard shipping tubes, labeled and ready for use next year.



## CARTOONS



Cartoons probably say more in less space than any other medium. This is especially true of the political cartoon, which can summarize complex issues as well as present basic positions in a single frame, often without captions. A current events course, using political cartoons as its foundation and sole source of material, is one of the most creative and innovative teaching techniques ever encountered by this author.

### Characteristics of Cartoons:

1. Characature - The synthesis of major stereotypes into a single cartoon character is the primary attribute of cartoons. These characters are identified with so closely because they reflect ourselves or a certain type of person in realistic, everyday situations.
2. Distortion, satire, and exaggeration - Characters, places, objects, and events are distorted and exaggerated for effect.
3. They convey complex themes or issues simply and visually.
4. Propaganda - They usually present an opinionated point of view.
5. Color is usually not necessary.
6. Usually present social messages.
7. They frequently rely on captions.
8. Primary ability is to influence public opinion.

### Utilization Principles:

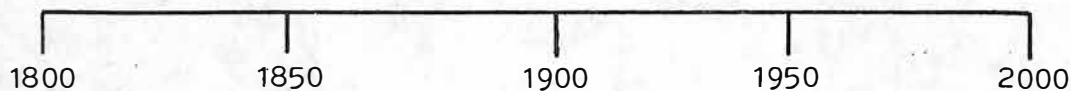
1. Use cartoons (especially content or political type) as means of presenting content and issues.
2. Cut strips (and longer Sundays) into individual frames, having students rearrange elements to teach plot sequence.
3. Remove captions and have students substitute their own.
4. Use cartoons for motivating students.

### CHARTS

#### Types of Charts

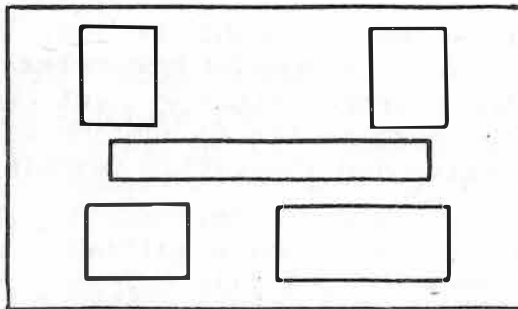
##### Linear or Ordinal Charts:

A line chart or any graphic that presents information in a linear format, such as a number line or a time line is an ordinal chart.



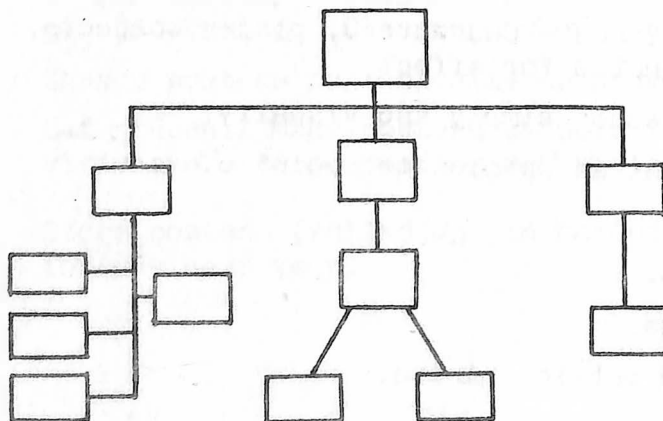
HISTORY OF EXPANSION OF . . . .

##### Tabular Charts:



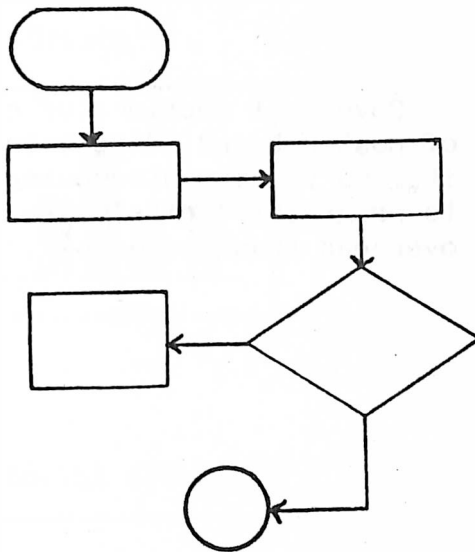
Charts that present visual or verbal information in tables is a tabular chart.

##### Organization Charts:



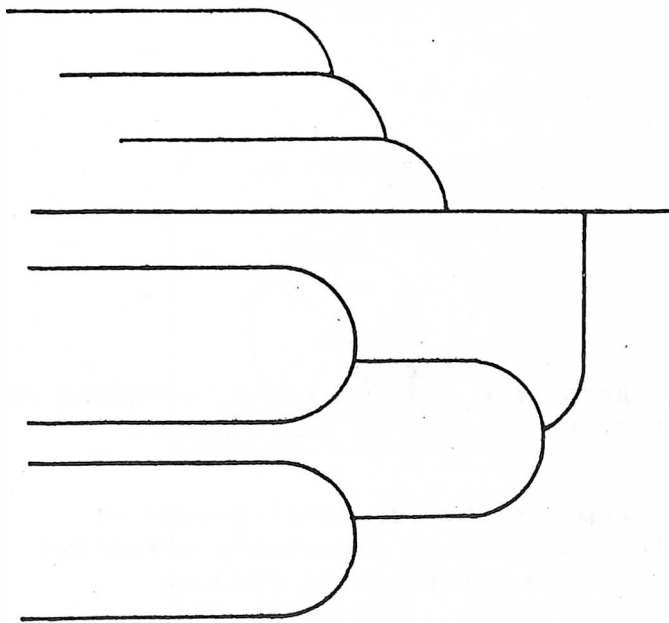
Charts that organize information hierarchically into units are invaluable visualizations of relationships, especially in business.

### Process or Flow Charts:



Visuals that show the flow of information or a process are referred to as flow charts. They are valuable in visualizing procedures or the development of a process, especially in computer programming where they originated.

### Tree or Stream Charts:



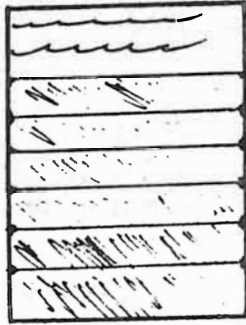
These are another type of chart that visualizes the flow of information, usually the derivation of an object, person or procedure. They are most frequently encountered in organizing tournaments or in family "trees."

### Characteristics of Charts:

1. Charts combine graphic and pictorial media.
2. Very effective in visualizing verbal or numerical information.
3. Visually summarize key facts or stages in a process.
4. Visualize relationships of ideas or quantities well.

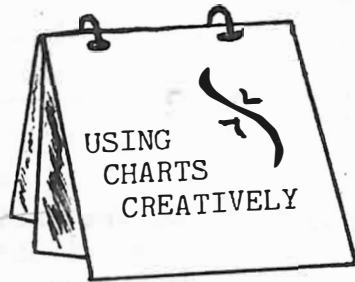
## Utilizing Charts:

### 1. Progressive Disclosure:



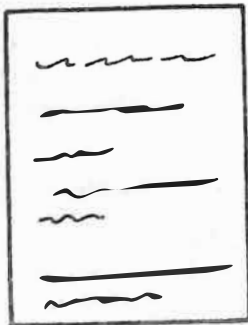
Cover all sections of chart with strips of poster board, disclosing each additional item as you are discussing them (similar to progressive disclosure technique for overhead transparencies).

### 2. Flip Charts:



Add rings or hinges to your charts that allow them to be flipped as you are presenting sequential information.

### 3. Experience Charts:

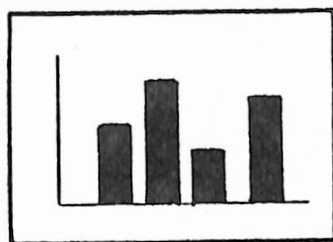


Recording student ideas, opinions or stories on a pad of chart paper.

Appropriate for small groups of students, and an especially effective technique for teaching reading.

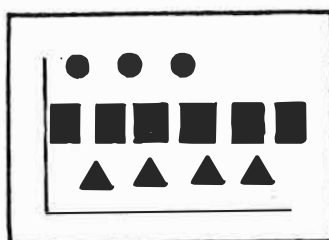
## GRAPHS

### Bar Graphs:



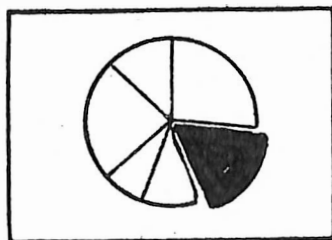
Effective for comparing quantities.

### Pictorial Graphs:



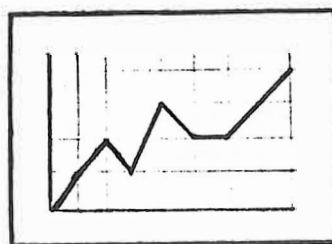
Adds the visualization of quantities as concepts. Sometimes confusing to students.

### Circle (Pie) Graphs:



Most effective of all, especially for relating quantitative parts to whole.

### Line Graphs:



Relate quantities to linear sequence such as time. Effective for visualizing quantitative progress.

### Characteristics of Graphs:

1. Visualize numerical or quantitative values well.
2. Compare quantitative information well.
3. Show quantitative relationships well.

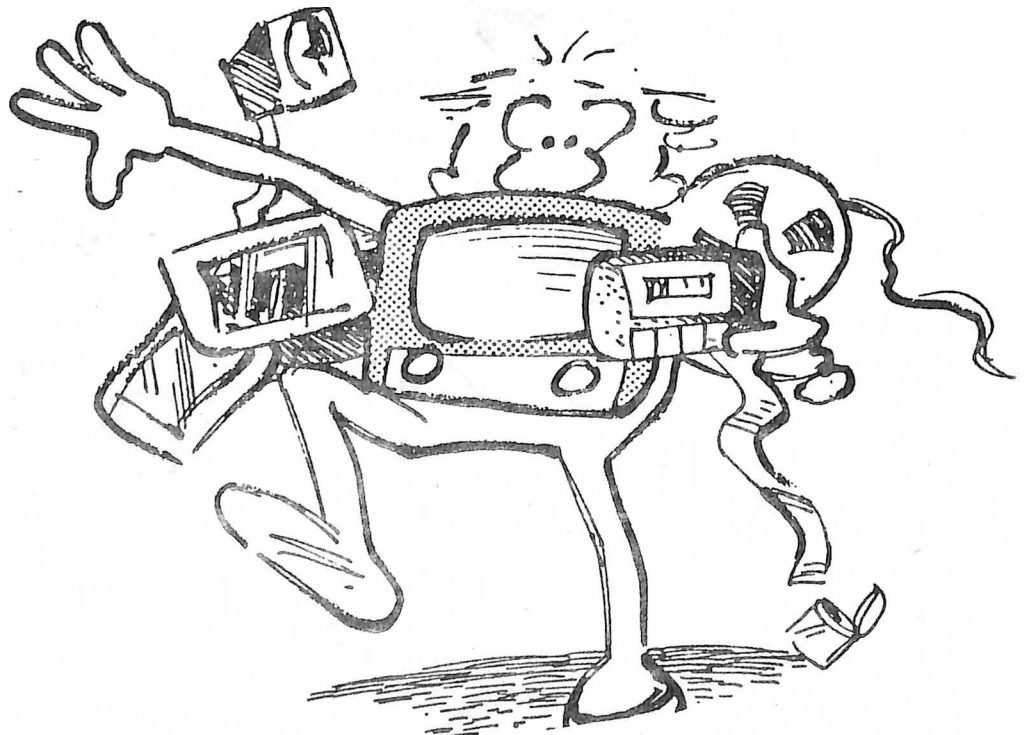
\* \* \* \* \*

### Principles for Creating Graphics:

The design of a graphic, i.e., the way in which the visual elements are included will affect the way it is perceived. To maximize communication potentials some fundamental aspects of design should be considered in terms of how they will be perceived.

1. Present one single idea per graphic or visual.
2. Simplicity: The visual techniques should be simple. Don't crowd graphics with clutter or visual confusion. A simple shaded line drawing will generally communicate as much or more than a realistic photograph.
3. Organize the design: This is referred to as the layout stage. Sketch out your visual to see how the elements will fit together.
4. Design a balanced graphic: Balance does not necessarily have to be formal or symmetrical (each half a mirror image of the other). In fact, formal balance is usually uninteresting. A more dynamic graphic will include objects of different sizes and shapes that create a visual balance.
5. Be Precise and Legible.

**CREATE  
VISUAL  
BALANCE**



## SELF-EVALUATION

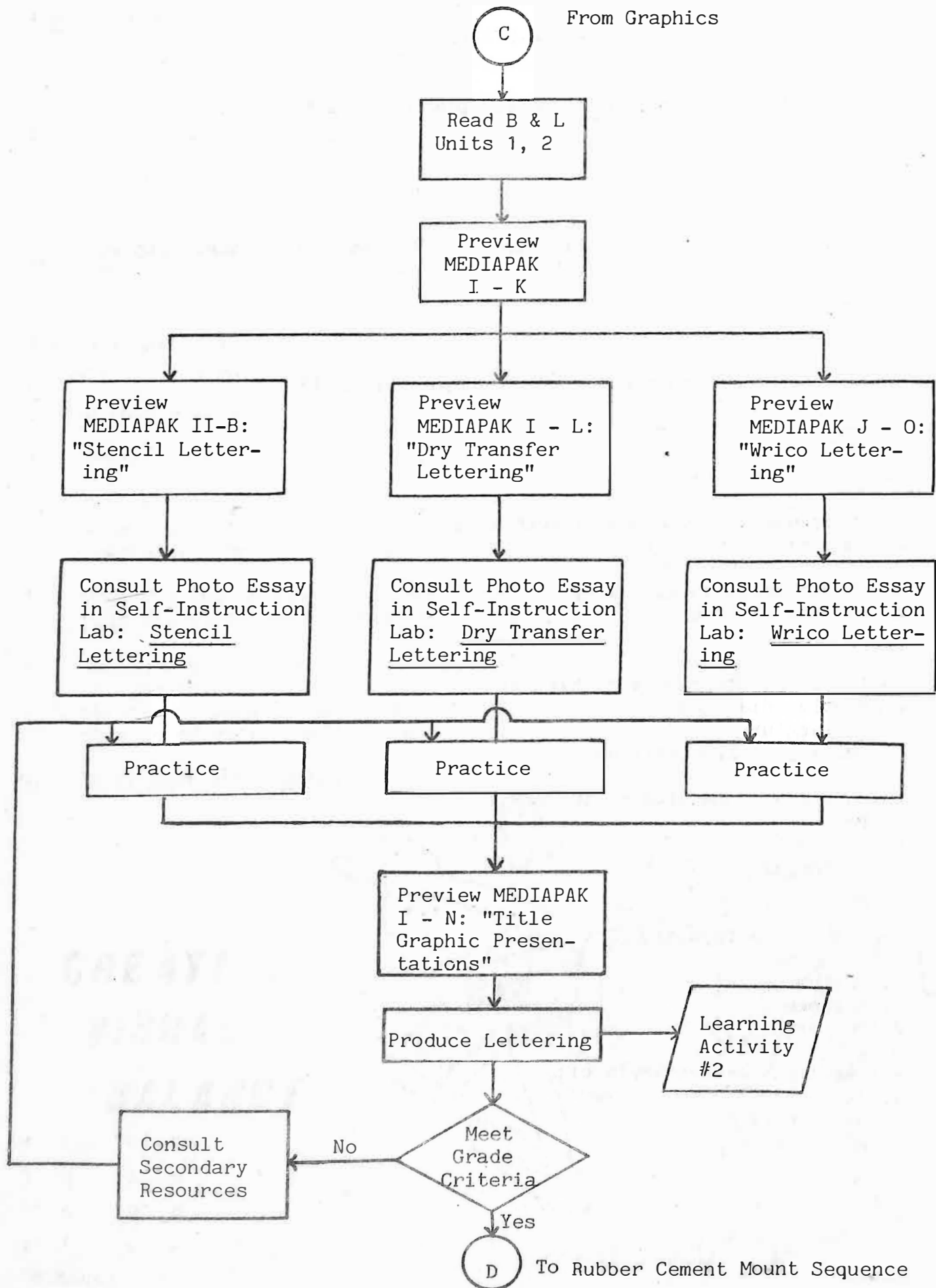
1. Which of the following is not an example of a graphic?
  - a. poster
  - b. chart
  - c. record
  - d. map
2. The level of visual information to which the study of visual literacy would be most relevant would be:
  - a. symbolic
  - b. representational
  - c. abstract
3. Graphics communicate through which sensory channel?
  - a. hearing (auditory)
  - b. smelling (olfactory)
  - c. feeling (tactile)
  - d. seeing (visual)
4. Which is not an advantage of graphics?
  - a. summarizes information
  - b. attracts attention
  - c. communicates subliminally
  - d. relates an idea
5. Cartoons are characterized by:
  - a. complex dialogue
  - b. caricature
  - c. realistic illustrations
6. Which graph communicates the most?
  - a. bar
  - b. circle
  - c. pictorial
  - d. line
7. Symmetry is a form of:
  - a. movement
  - b. rhythm
  - c. balance
  - d. texture
8. A time line is an example of:
  - a. flow chart
  - b. data chart
  - c. sequence

4. b    8. c  
3. d    7. c  
2. c    6. b  
1. c    5. b

ANSWERS:

# LETTERING

From Graphics





## LETTERING

Assignment #2

pp. 15-19 AVITM

### Behavioral Objective

The student will correctly use the three (3) below listed lettering techniques to produce a title card of poster board. The student will create at least 2 words with each type of lettering. (On 8 x 10" piece of show card or larger)

### Techniques

Stencil (no pencil - ink only)

WRICO

Dry Transfer Letters

----- (Cut here and attach to assignment when submitted) -----

### EVALUATION:

Name \_\_\_\_\_

#### Scale Range

#### Student Rating

#### Instructor Rating

0 - 5 Optical spacing of letters

0 - 5 Absence of "bleeding" ink

0 - 5 Ink evenly distributed

0 - 5 Unbroken transfer letters

0 - 5 Letters are ALL on the  
line and LEVEL

TOTAL

\_\_\_\_\_  
25

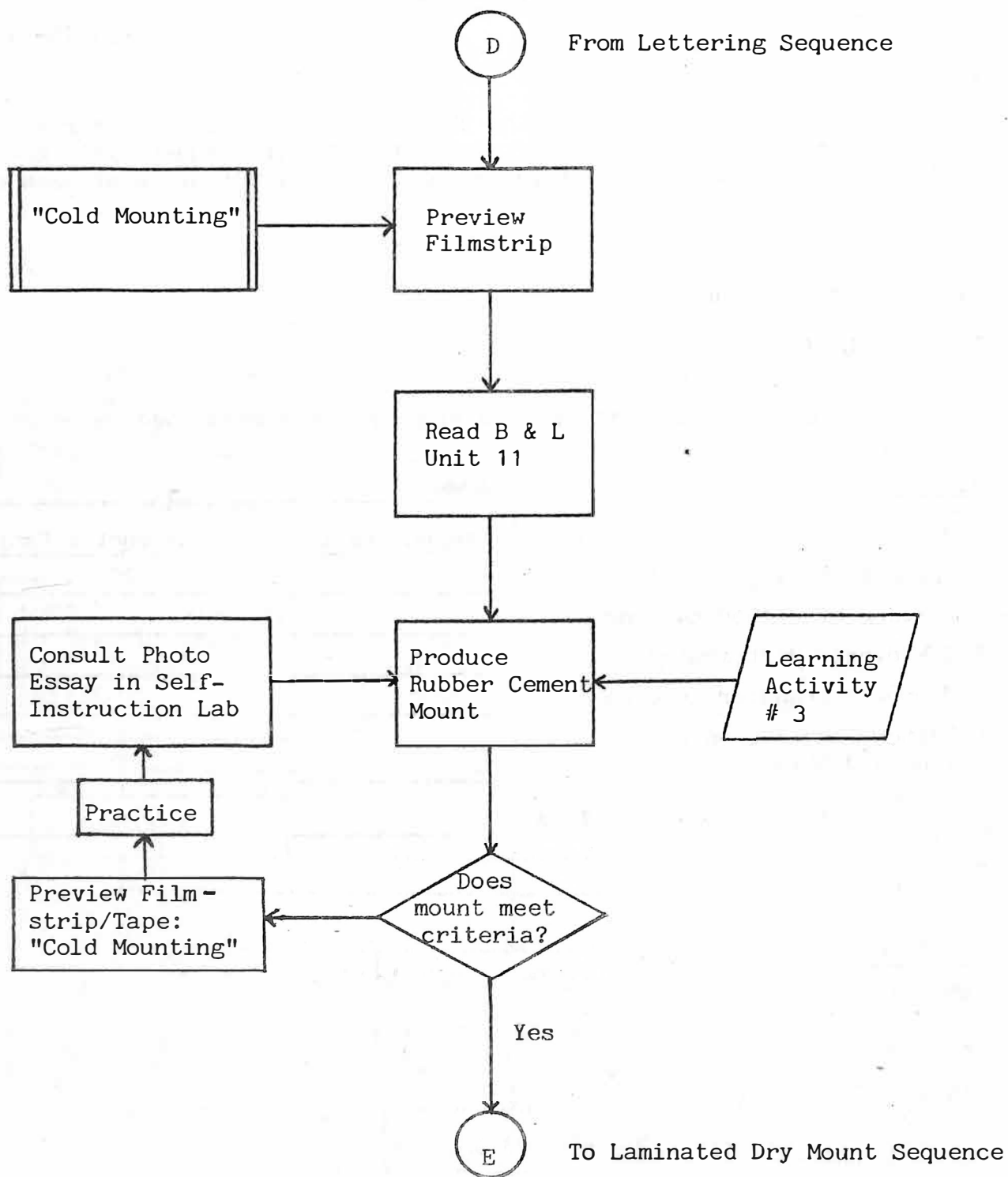
### Grading Scheme

23 - 25 = A

20 - 22 = B

17 - 19 = C

# RUBBER CEMENT MOUNT



# RUBBER CEMENT MOUNT

Assignment # 3

p. 36 in AVITM

## Behavioral Objective

The student will properly rebbber cement mount a 5 x 7" (or larger) picture to a piece of tagboard. The mount will have a border to frame the picture.

## Materials needed:

5 x 7" or larger picture  
piece of tagboard  
bottle of rubber cement with applicator brush  
2 pieces of wax paper  
pair of scissors  
piece of newsprint

## Production steps:

1. Center picture on tagboard. Lightly mark corners with pencil.
2. Place picture FACE DOWN on newsprint.
3. Brush thin even coat on the picture back using straight long strokes.  
Set aside to dry.
4. Coat FRONT of tagboard with rubber cement (mounting area only). Set aside to dry.
5. When BOTH picture and tagboard are thoroughly dry cover tagboard with two overlapping pieces of wax paper.
6. Place picture on top of wax paper. Match picture edge with pencil marks (see step 1).
7. Slowly withdraw wax paper while holding picture in place.
8. Cover picture with newsprint and burnish to smooth and drive out air.
9. Roll off excess rubber cement with fingers.

(Cut here and attach to assignment when submitted)

## EVALUATION:

Name \_\_\_\_\_

## Scale Range

Student

Instructor

0 - 5 Absence of bubbles or high spots

0 - 5 Absence of excess rubber cement  
on edges of mount

0 - 5 Permanency of mount-all edges  
down flat

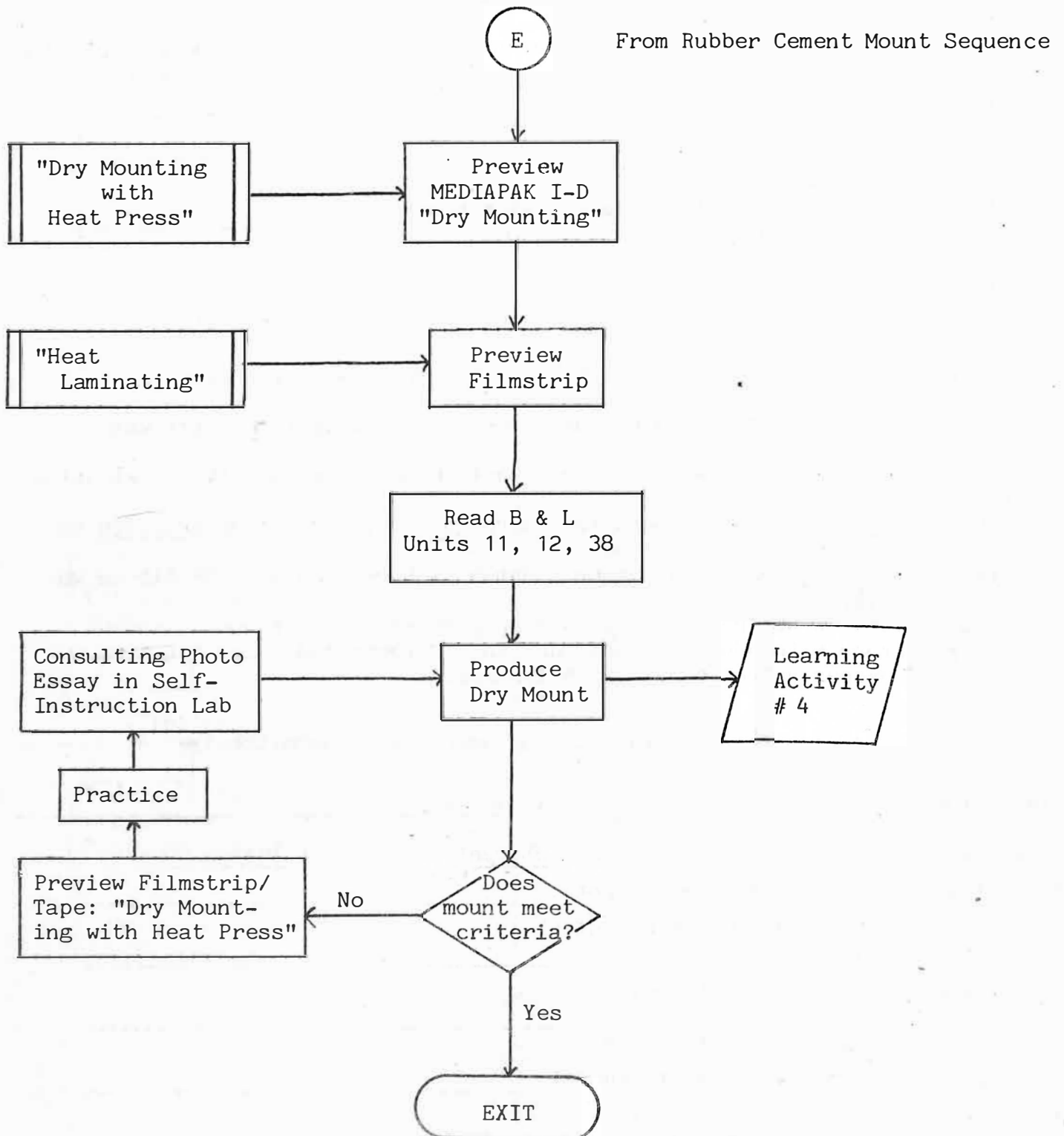
0 - 5 Even margins on all sides  
except bottom (more margin there)

0 - 5 Absence of faded look around  
edges of mount and picture  
caused by the removal of an  
extreme excess of rubber cement.

TOTALS

Grading Scheme: 23 - 25 = A    21 - 22 = B    19 - 20 = C

# LAMINATED DRY MOUNT



## LAMINATED DRYMOUNT

### Assignment # 4

The student will properly drymount and then laminate a 5 x 7" (or larger) picture to a piece of tagboard, poster board, or show card.

#### Materials needed:

sheet of lamination film large enough to cover both picture and tagboard  
5 x 7" or larger picture  
piece of tagboard  
sheet of drymount tissue  
sheet of newsprint or release paper  
pair of scissors  
Exacto knife or razor blade  
tacking iron  
drymount press (or hand iron)  
paper cutter (or razor & cutting board)

#### Production steps:

1. Set drymount press at 225° F. and allow 10 minutes to warm up.
2. Set tacking iron to "high"
3. Place photo in newsprint or release paper and place in press for one minute to dry out. Do likewise to piece of tagboard.
4. Turn photo face DOWN and cover with drymount tissue. (Tissue must be large enough to be congruent with or exceed edges of picture.)
5. Tack tissue to photo by lightly touching tacking iron to center of tissue.
6. Turn photo over and trim with paper cutter or scissors. (Tissue must not show at edges of picture.)
7. Center photo on tagboard. Lift up each corner of photo and lightly tack tissue to board.
8. Place the whole works inside newsprint or release paper.
9. Place in press (or iron) for 5 to 10 seconds. If it doesn't adhere the first time give it another 10 to 15 seconds. Repeat this step until it is firmly mounted.
10. Place lamination film over tagboard -- shiny side up.
11. Trim edges of lamination so only an inch or two exceeds tagboard all the way around.
12. a. USING NEWSPRINT: Either tack excess lamination to back of board or lay board on newsprint (faceup) and tack excess lamination to newsprint.  
b. USING RELEASE PAPER: Lay drymounted picture on release paper faceup. Cover with lamination film (dull side DOWN). No tacking necessary. Fold release paper over to make "sandwich" for the press.
13. Place "sandwich" in press at between 270° and 300° F. for 15 to 30 seconds.
14. Remove from press and check for white (air) spots. Return to press for 30 seconds more if spots persist. Repeat as necessary.
15. Trim lamination if necessary.

EVALUATION:

Name \_\_\_\_\_

<u>Scale Range</u>	<u>Student</u>	<u>Instructor</u>
0 - 5 Absence of bubbles or high spots	_____	_____
0 - 5 Mounting tissue should not show	_____	_____
0 - 5 Permanency of mount - all edges down flat	_____	_____
0 - 5 Edges of picture parallel to mount edges	_____	_____
0 - 5 Even margins on all sides except bottom (more margin there)	_____	_____
0 - 5 Absence of wrinkles or white spots on laminated surface	_____	_____
<u>30</u>	TOTALS	_____

Grading Scheme:

27 - 30 = A

24 - 26 = B

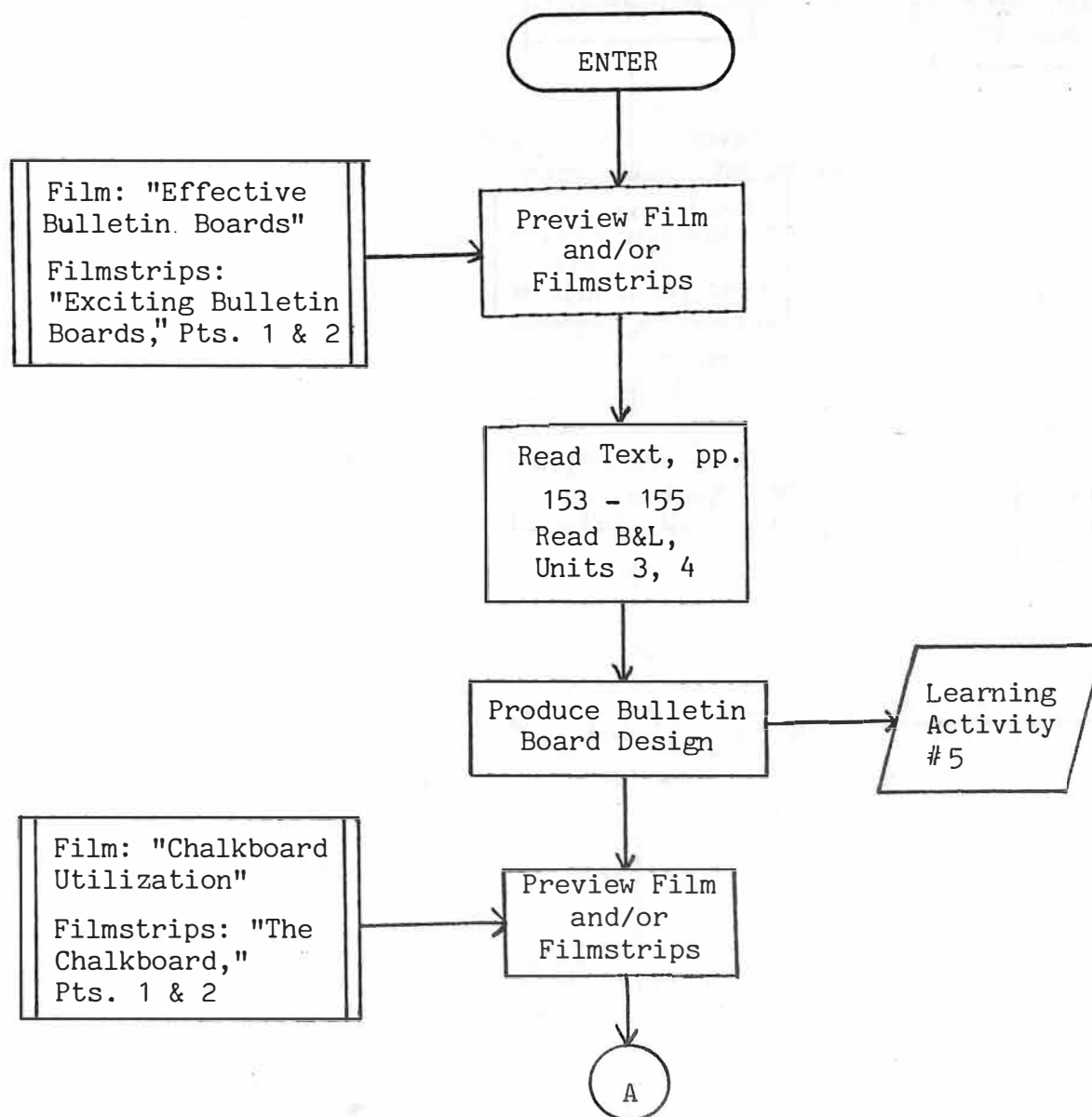
21 - 23 = C

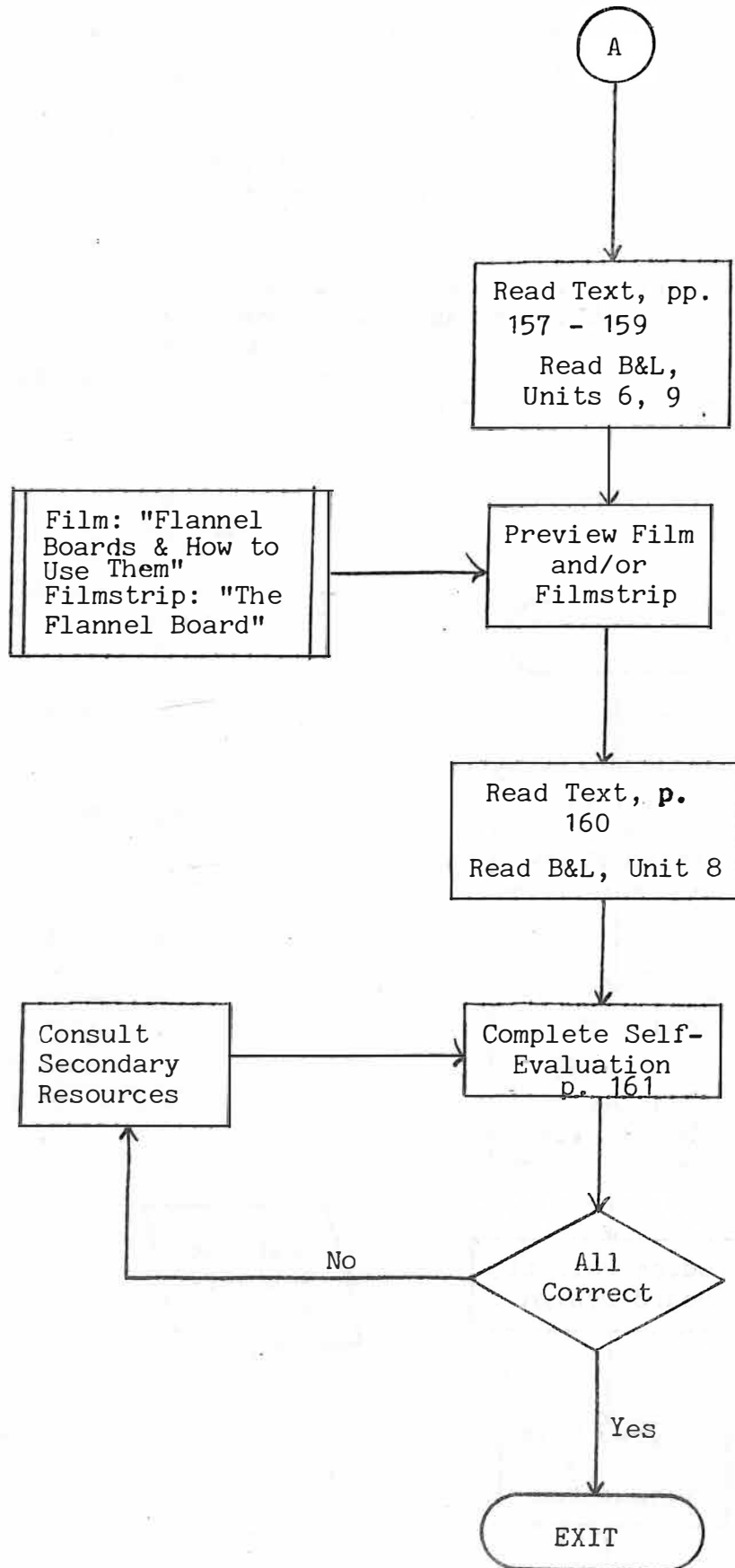
DISPLAY SURFACES  
(Bulletin Boards, Chalk Boards, Feltboards)

Instructional Objectives:

1. Given a variety of instructional settings and objectives, be able to prescribe the most appropriate display surface to fulfill that objective, stating reasons for that choice.
2. Be able to list characteristics, advantages, disadvantages and applications of bulletin boards, feltboards, and chalk boards.
3. Be able to design an effective bulletin board, incorporating principles of design and composition.

Task Sequence:







## BULLETIN BOARDS

Bulletin boards, along with chalk boards, are undoubtedly the most ubiquitous media in schools. Both are available in schools dating back to the turn of the century. They both belong to a class of media known as display surfaces, that is, flat surfaces onto which items may be affixed for purposes of displaying them. All too often, bulletin boards are the anathema of most teachers. They represent an onerous chore having to be changed periodically. This perception is wrong however. Bulletin boards can become a dynamic and integral teaching device as well as a valuable instructional activity for students. In this age of electronic media, the basic, more established media are too often neglected. Valuable teaching potential is lost because of this neglect. Read the next few pages, and use your imagination.

### Characteristics of Bulletin Boards:

1. Bulletin boards may be fixed on wall, movable, on folding screens, suspended from ceilings, or recessed into the wall.
2. A variety of background materials are available.

Cork	Crepe paper	Fabric
Linoleum	Grass cloth	Old maps
Loosely woven cloth	Window screening	Newspapers
Colored paper	Carpet remnants	Wall paper
Chicken wire mesh	Corrugated cardboard	Butcher paper
3. Substance or content displayed on the boards come from a variety of sources:

Pictures from:	books	Posters
	magazines	Printed announcements
	newspaper	Purchased prints
	pamphlets	Photographs
Student assignments	Graphics:	charts
		graphs
4. Emphasis on connection of ideas can be provided by using:

colored string or yarn	pre-cut or dry transfer letters for
chalk	captions
arrows	textured materials
color pins or tacks	colored construction paper

### Advantages of Bulletin Boards:

1. Materials are easy to locate and readily available.
2. They are inexpensive and easy to create.
3. Materials may be viewed at the students own pace.
4. May serve an infinite variety of purposes.
5. Suited for individualized instruction.

6. Materials may be saved and re-used.
7. Improve the atmosphere of the classroom.
8. Provide stimulation for discussion.

#### Disadvantages:

1. Limited to two-dimensional visuals.
2. Not appropriate for group instruction.
3. Somewhat time consuming.

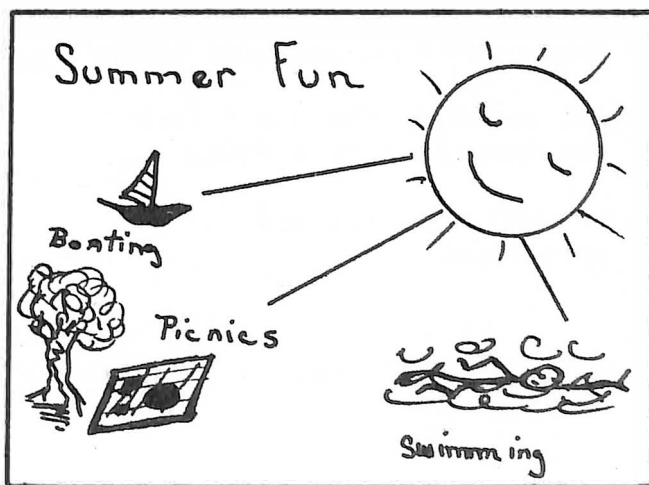
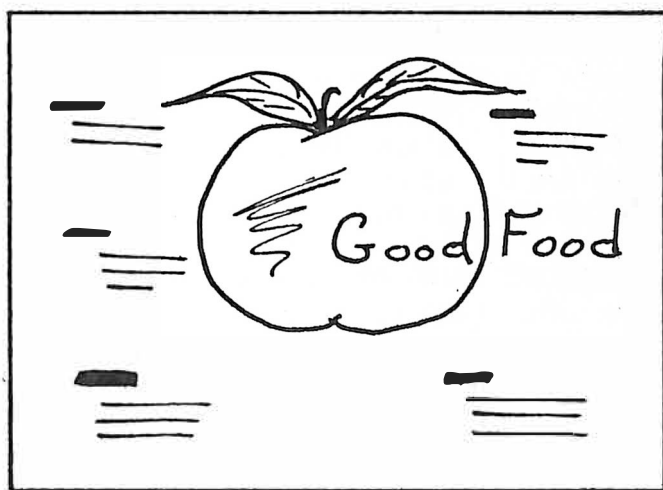
#### Instructional Applications:

1. Post announcements and student assignments. If students become used to checking the board, valuable class time can be saved. Do not limit your use to this purpose.
2. Improving the classroom environment can be achieved by providing exciting, stimulating bulletin boards. To supplement a unit of instruction, fill bulletin boards (and walls) with colorful illustrated materials relevant to the unit topic.
3. In the above fashion, bulletin boards can be used to create readiness or awareness prior to a unit of instruction.
4. Increase perceptiveness by displaying an interesting visual (photo, graphic) without any discussion. Leave it up for a week and then remove it. Ask questions about it, while providing reinforcement to those students who attended to it. Students will become more aware of visual stimulation in the classroom.
5. Dedicate a section of the board to current events, including newspaper and magazine clippings, etc.
6. Perhaps the least utilized application is to use bulletin boards as learning stations for individualized instruction. Visual elements on the board can be supplemented by verbal information and instructions included on a cassette tape.
7. Pictorial reviews of school activities, such as plays, fieldtrips, etc.
8. Use as student projects. Assign a theme and allow students to design and produce a bulletin board display. The students enjoy it (in fact, will even stay in from recess to do it). Let students experiment. It's an excellent display surface for collages.
9. Substitute bulletin board displays for student papers: let the student visualize their papers, collecting and creating supportive materials.

#### Principles for Preparing Bulletin Boards:

1. Each board should include only one theme or idea. Different boards should be used to display other ideas.
2. Visually plan the board by making a rough sketch of the ideas. Revise and rework if balance or interest are not achieved.

3. Collect and organize your materials, then put up the display.
4. Ask questions! This attracts attention and gets the students to interact with the bulletin board.
5. Use color titles, headlines, captions, or other attention getters.
6. Use materials that can be stored easily in files or boxes for re-use later.
7. Leave up the display only while it is relevant to the topic of instruction. Announcements should be changed daily.



CREATE EFFECTIVE BULLETIN BOARDS

## BULLETIN BOARD LAYOUT

### Assignment #5

#### BEHAVIORAL OBJECTIVE

The student will layout a bulletin board on a sheet of 11 x 14" tagboard. The board will be organized around a single theme. The board will be lettered using one or more of the techniques that have been discussed in class.

#### Materials needed:

sheet of 11 x 14" tagboard (maximum size)  
#2 pencil  
lettering materials

#### Production steps:

1. Decide on subject content.
2. Choose a single theme based on that content.
3. Decide on design -- formal or informal.
4. Do layout. (Remember; headlines and captions must be eye-catching!)

----- (Cut here and attach to assignment when submitted) -----

#### EVALUATION

Name \_\_\_\_\_

#### Scale Range

#### Student

#### Instructor

0 - 3 Effective captions

\_\_\_\_\_

\_\_\_\_\_

0 - 3 Board exhibits balance

\_\_\_\_\_

\_\_\_\_\_

0 - 3 All parts of the board work  
together to form a whole

\_\_\_\_\_

\_\_\_\_\_

0 - 3 Overall neatness and  
appearance

\_\_\_\_\_

\_\_\_\_\_

#### TOTALS

\_\_\_\_\_  
12

\_\_\_\_\_

\_\_\_\_\_

#### Grading Scheme:

11 - 12 = A

9 - 10 = B

8 - 9 = C

## CHALK BOARDS

Perhaps even more ubiquitous than bulletin boards are chalk boards in schools. From the 18th century when students wrote on slate tablets, the chalk board has been magnetized, colored (bright green, yellow, brown rather than slate grey), and otherwise suitably enhanced. An enterprising company has even developed a white-board, as opposed to the traditional black board. A problem in erasing the black chalk, as opposed to white chalk, has militated against its universal popularity. Perhaps, tradition is playing a role too.

### Characteristics of Chalk Boards

A chalk board consists of a porous surface of miniscule ridges and valleys (figure 1). As the chalk, a soft, powdery substance, is dragged across the rough surface, portions of it are deposited in the valleys or grooves of the board. Where it collects a line is formed. Erasing it removes most of the top layer of deposited chalk. Washing the board with water to dissolve the chalk residue is required to remove all of the chalk.

If you don't have a chalk board or your's is not magnetic (metallic allowing magnets to adhere), you can easily make your own. Use a large, flat sheet of metal (oil drip pan, cookie sheet). Scrub the surface with steel wool and a mild acidic solution (like vinegar) to facilitate bonding, and then spray or brush on special chalk board paint. Allow to dry. Treat by rubbing the chalk piece over it, and you're in business. It's as easy as that.



Figure 1. CROSS-SECTIONAL VIEW OF CHALK BOARD SURFACE

### Advantages of Chalk Boards:

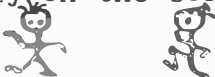
1. They are almost always available.
2. If not available, they can be inexpensively produced.
3. Don't require elaborate preparation.
4. Mistakes are easily removed.
5. Best for quick visualization of ideas.

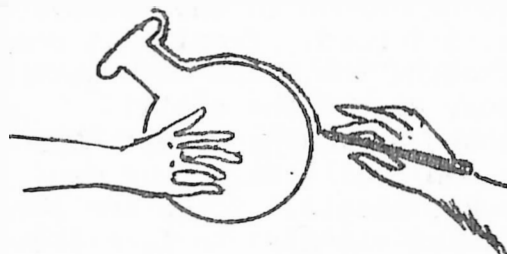
### Disadvantages:

1. Usually not portable. Most frequently built in, so students must accomodate position of the board.

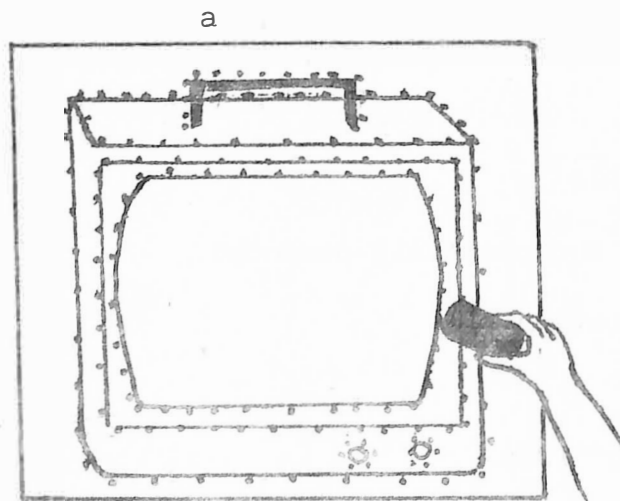
2. Teacher loses rapport while writing on the board.
3. Overused: frequently depended on as the primary instructional medium.

#### Instructional Applications:

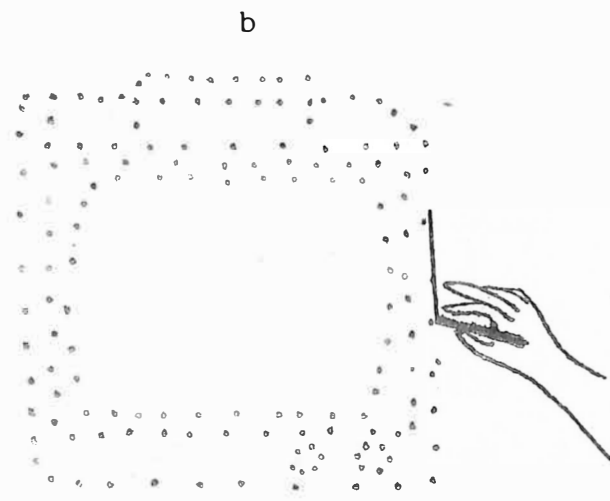
1. Hidden chalk board: Write quiz or material on the board and cover with a curtain or map.
2. Use for quick reference.
3. Cartoon and stick figures drawn competently on the board have been proven to be an effective communicator. 
4. Other materials can be displayed. If you have a metallic, rather than a slate board, magnetic materials may be displayed and combined with chalk instruction.
5. Make up cardboard or plywood templates for frequently drawn objects. Simply trace around the outside to make consistently accurate drawings.



6. Prepare complicated drawings by using either of two methods:
  - a. Make a transparency, projecting it on the board and then tracing the figure on the board.
  - b. Use a grid. Create a drawing on a heavy stock paper, punching holes every inch along the outline of the form. Position the grid on the board and pat a dusty eraser over the holes along the outline. Remove the grid and fill in the lines between the dusty dots to create a drawing.



Pat dusty eraser over template



Connect the lines to create drawing

Principles of Utilization:

1. Don't overcrowd the board. Use more than one board or stop after discussing content and erase before adding new information.
2. Print largely and legibly.
3. Sketch ideas simply using simple figures.
4. Prepare complicated drawings (described above) ahead of time.
5. Stand to one side of board when discussing information presented on it, using a pointer.
6. Clean board by erasing after use. Don't wash too frequently.
7. Use color chalk when available for emphasis.

## FELT (FLANNEL) BOARDS

Felt boards can be one of the most creatively and effectively used instructional media, especially in elementary school. The materials for producing are inexpensively and readily available. If your class doesn't have a commercially prepared felt board, one can be easily produced by stretching felt fabric (available at any yard goods store) over a stiff board (cardboard, plywood, etc.) and tacking or taping it on the back. Individual student lap boards for independent manipulation of items may be made in the same way. With some creativity, the felt board can become an invaluable teaching tool.

### Characteristics:

The felt or flannel surface is a coarse-weave fabric that will intertwine with other fabric or rough surfaces, causing one to cling to the other. Characters or objects can be made from:

- fabric, such as cotton, wool, flannel, felt, burlap
- yarn
- ribbon (felt or velveteen)
- textured paper
- foam rubber
- styrofoam

Objects can be backed with sandpaper (using glue) and adhered to a feltboard.

### Advantages of Felt Boards:

1. Materials readily available and inexpensive.
2. Much creativity can be applied.
3. May be manipulated by students.
4. May also serve as a teacher demonstration medium.
5. Many interesting felt board teaching kits are available from commercial publishers.

### Disadvantages:

1. Adhesion sometimes tenuous; objects fall off.
2. Some felt board objects are easily destroyed.

### Instructional Applications:

1. Illustrate stories by creating felt characters.
2. Illustrate concepts, such as number.
3. Use color or shape in objects to differentiate sets or classes of objects.
4. Use small student lap boards to give students problems to be solved using felt characters.



## SELF-EVALUATION

1. When teaching geography and needing an accurate map of the U.S. drawn on the black board, the most practical device to help students produce one is:
  - a) a template
  - b) a grid
  - c) a stencil
  - d) a map transparency, projected
2. The easiest way for most teachers to enlarge a line drawing from a book, with accuracy is to use:
  - a) the "grid" method
  - b) freehand sketching
  - c) opaque projection
  - d) templates and compass
3. Bulletin boards and other displays should be developed with fundamentals of good display design. Five of these fundamentals are:
  - a) harmony, contrast, balance, emphasis, shape
  - b) harmony, color, shape, emphasis, contrast
  - c) harmony, size, color, contrast, balance
  - d) harmony, shape, balance, contrast, size
4. To letter a poster quickly and well, the best method for most people would be to:
  - a) develop an individual freehand style
  - b) use lettering guides
  - c) transfer the letters from other printed material
  - d) cut out and glue letters
5. Optical spacing of letters means:
  - a) providing equal linear space between letters
  - b) giving equal linear space for each letter
  - c) spacing for easy and convenient reading
  - d) giving unequal space to each letter according to its size
6. Which of the flannel board coverings holds display items most securely?
  - a) felt
  - b) velcro (hook-and-loop fabric)
  - c) cotton flannel
  - d) wool

ANSWERS:  
1. b  
2. c  
3. c  
4. b  
5. b  
6. b

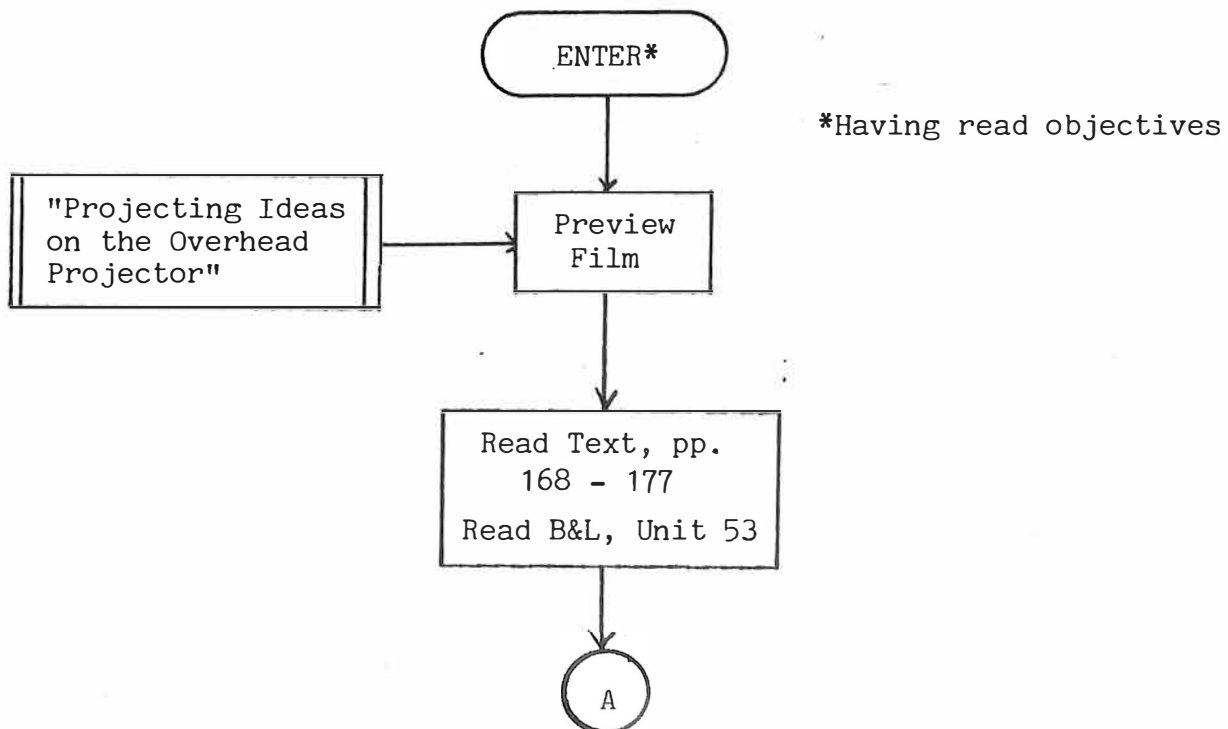


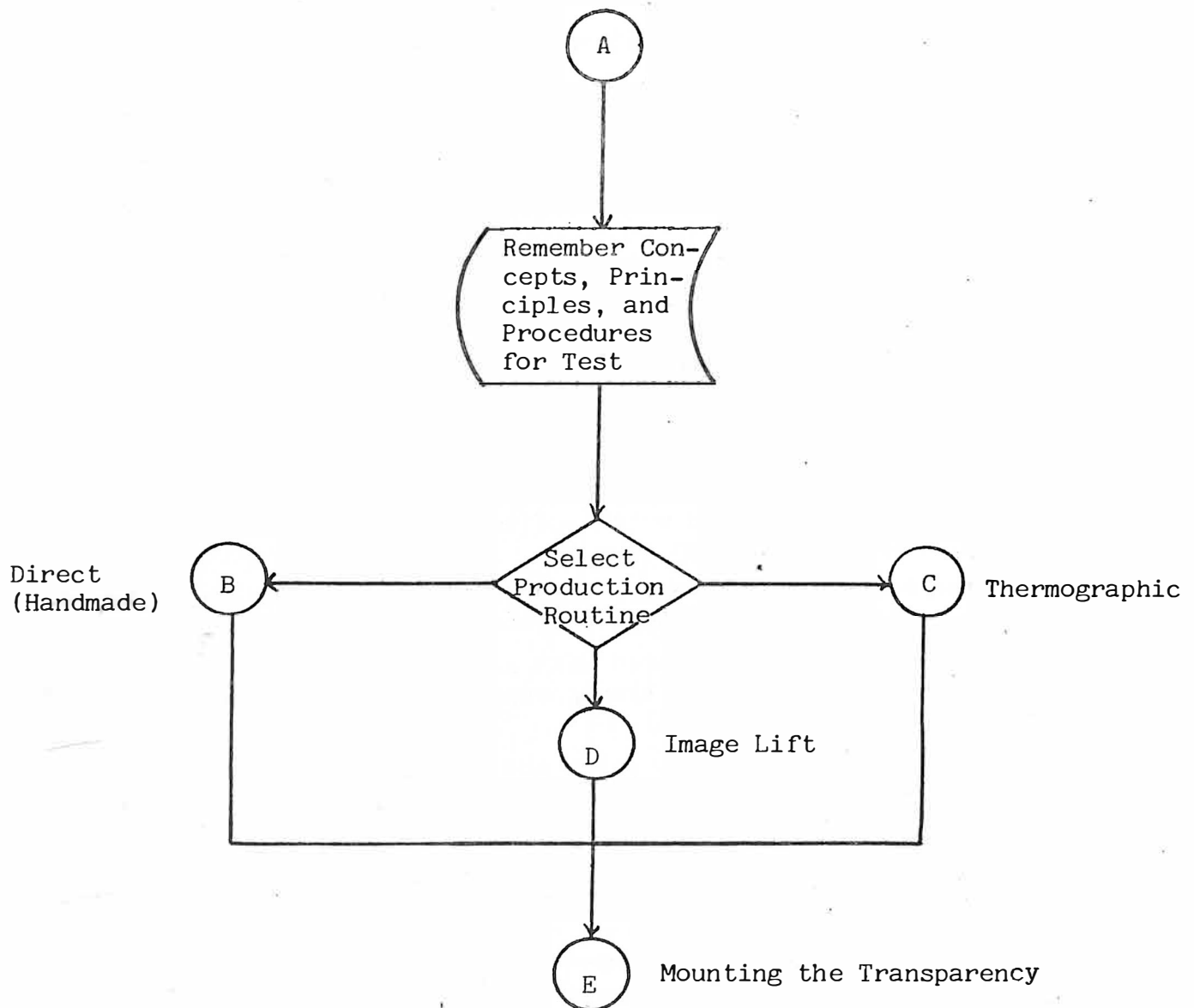
## OVERHEAD PROJECTION AND TRANSPARENCIES

### Instructional Objectives:

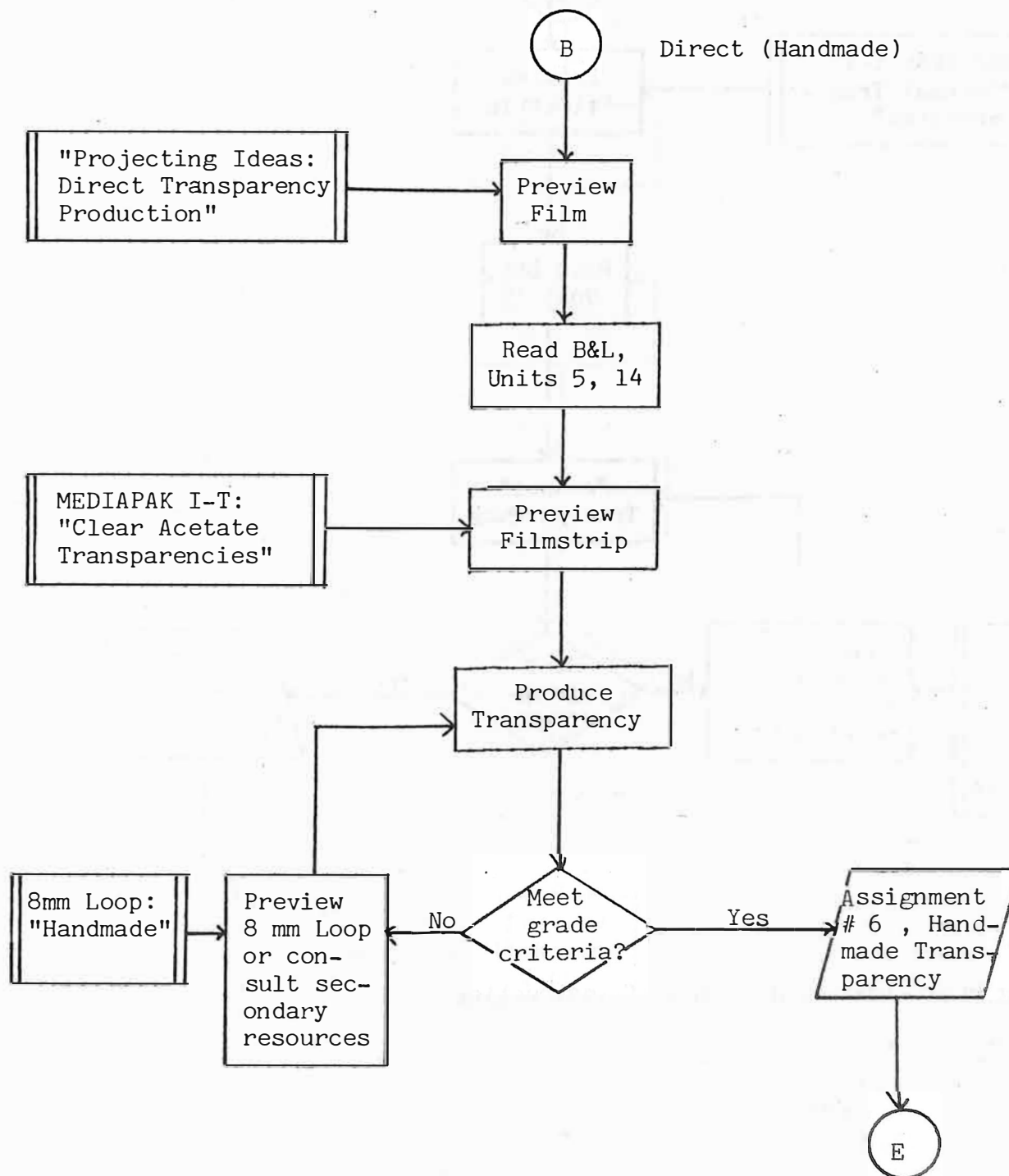
1. Be able to list the fundamental characteristics, advantages, and disadvantages of overhead projection and transparencies.
2. Applying the utilization principles described in the text, be able to properly project and present transparencies during an instructional lesson.
3. Given an instructional problem, situation or objective, be able to design and produce an overhead transparency that will facilitate completion of the objective or communicate the instructional intent.
4. Be able to produce three types of transparencies:
  - a. Given a visual printed on clay-based paper, be able to produce an image-list transparency through which sufficient light can be projected to form an image in a lighted room;
  - b. Given the necessary materials, be able to produce a handmade transparency, suitable for overhead projection;
  - c. Using handmade masters created with a carbon-based substance, be able to produce a thermographic transparency with at least one overlay appropriate to the base cell;
  - d. Given a transparency mount, tape, and hinges, be able to neatly mount each transparency such that material is parallel/perpendicular to the edges of the frame and no transparency edges are unprotected.

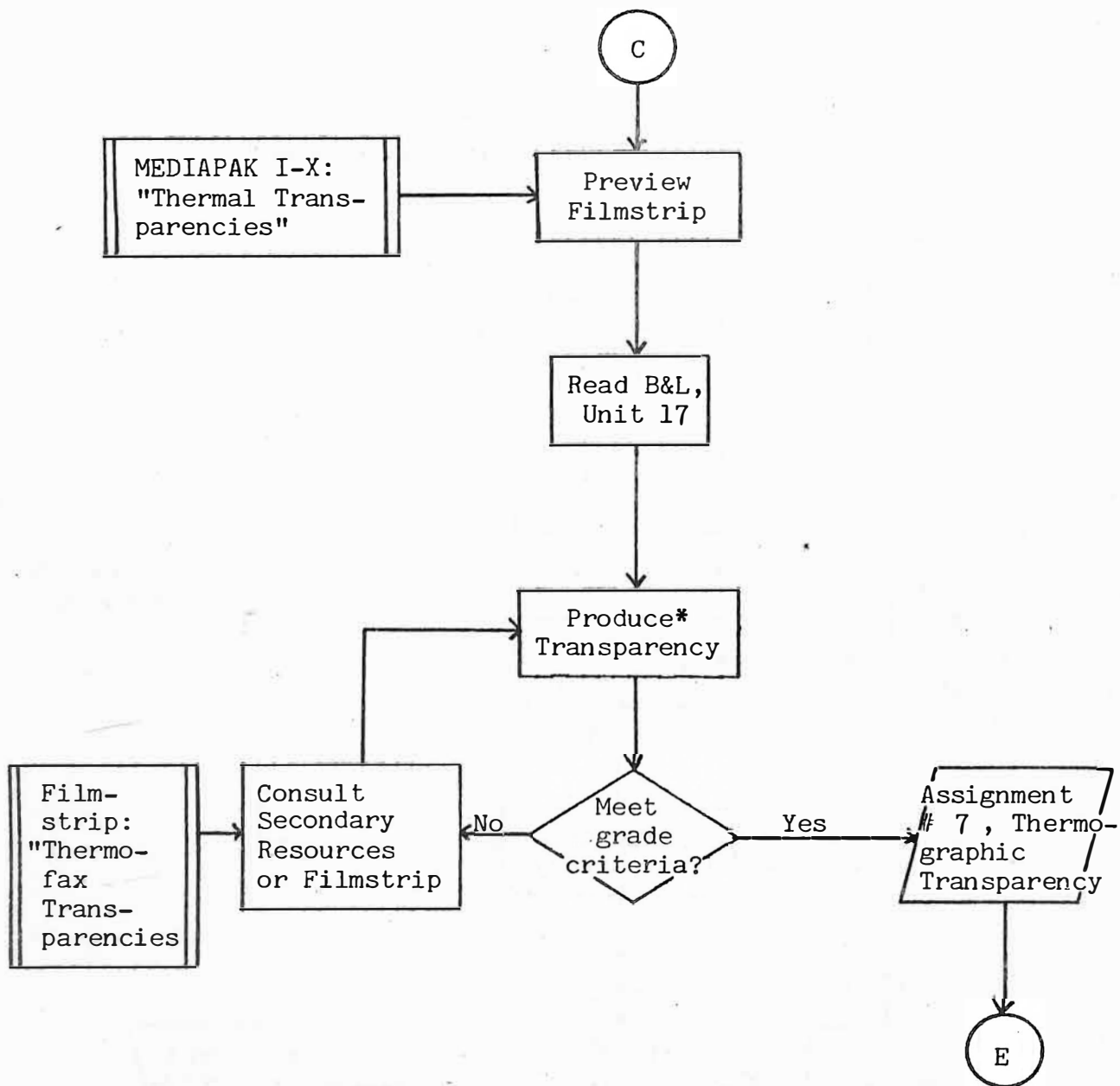
### Task Sequence:



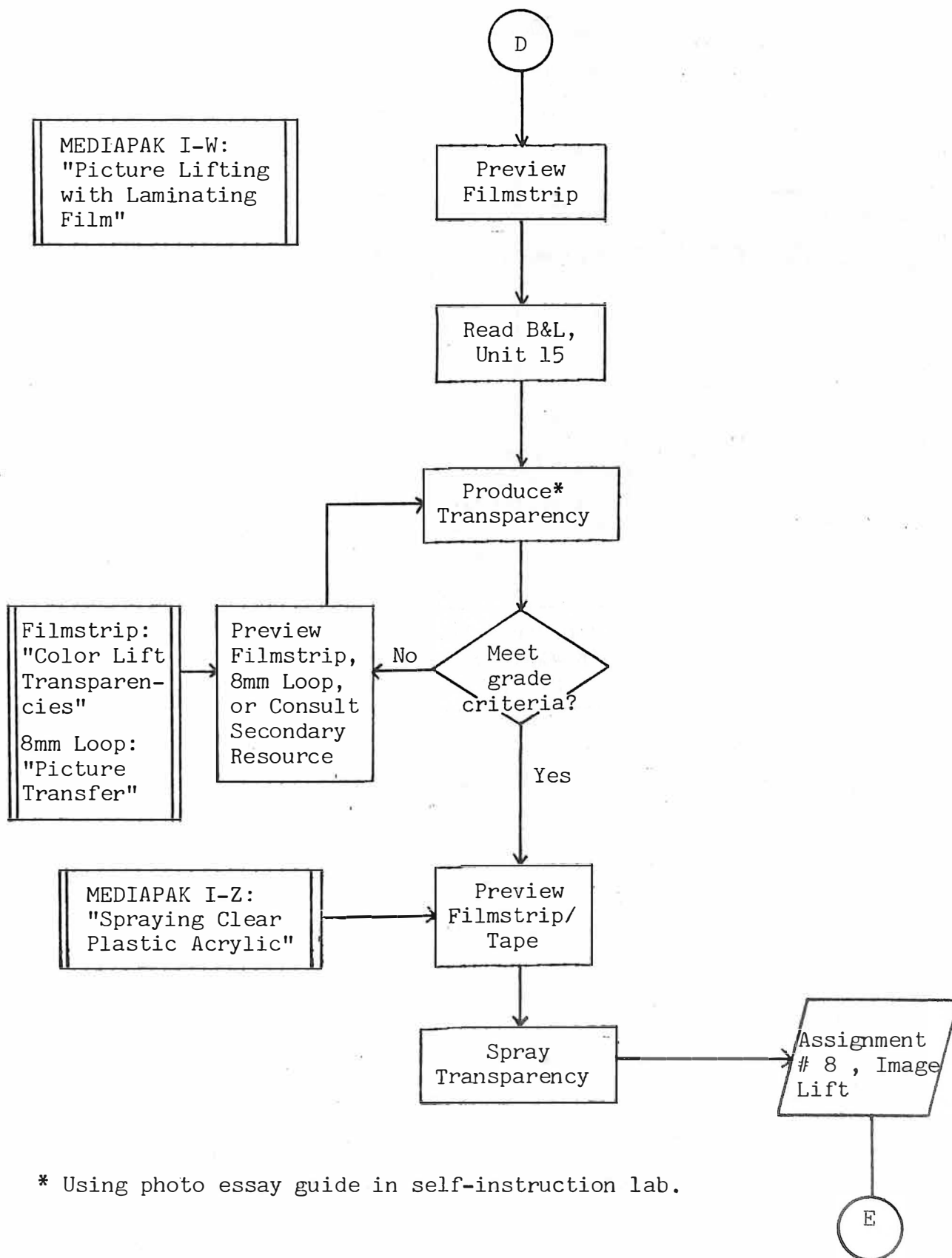


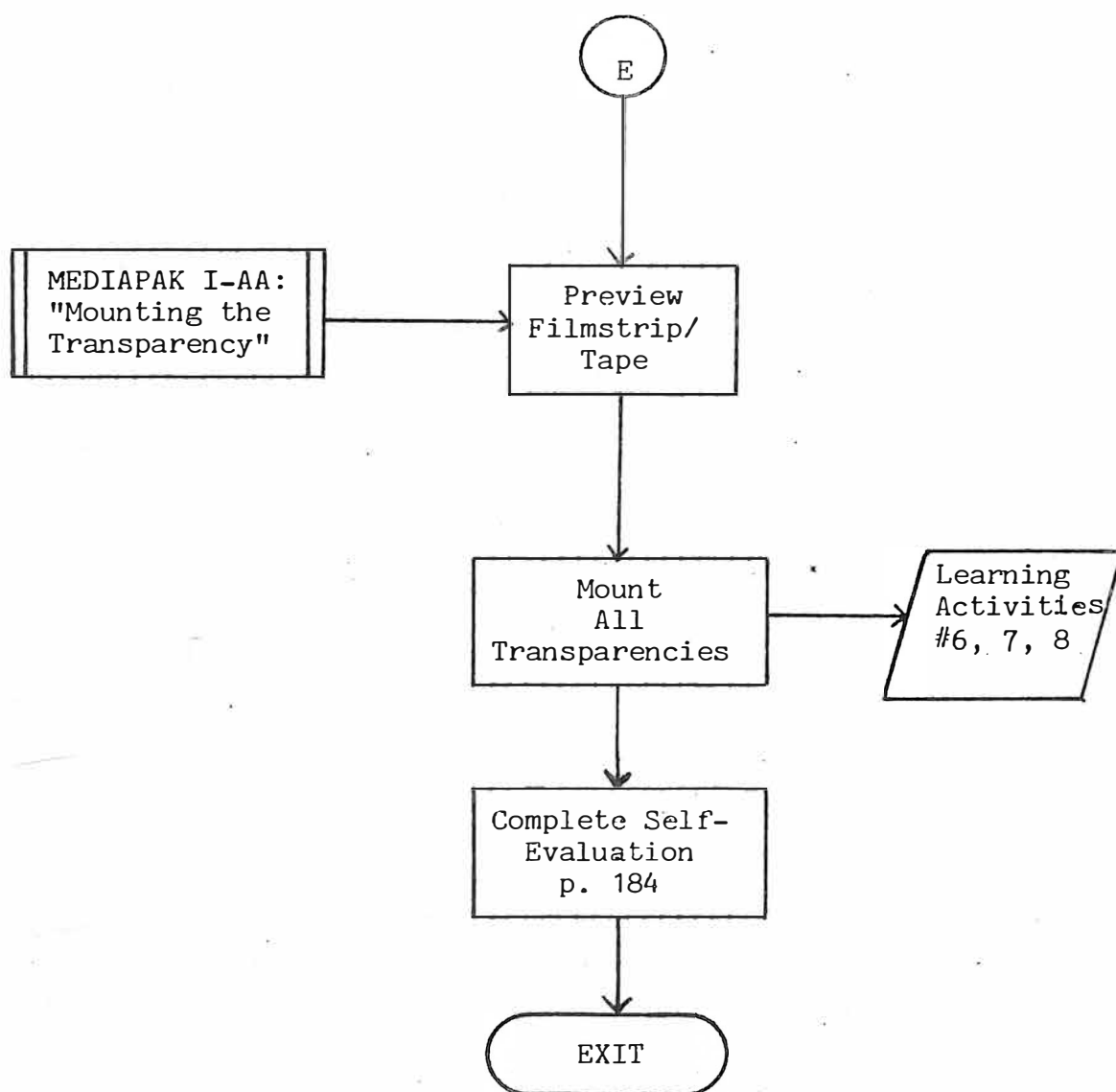
Production Routines:





\* Using photo-essay guide in self-instruction lab.







### Overhead Projection:

People are visual minded. Estimates of the percentage of learning that occurs visually range as high as 90%. There is little doubt that the visual sensory mode is most frequently stimulated in our visual culture. There is also little doubt that this sensory channel has the greatest capacity for receiving information. So the advantages of visualizing information that you are trying to "teach" or communicate should be obvious.

One of the simplest media to produce and use is the overhead projector with transparencies. These range from "quick and dirty" or "one-shot" transparencies to elaborately produced visuals.

Overhead projection is primarily a group medium, not usually adapted to individualized instruction. The instructor controls the pace of the presentation, using the transparencies to visually supplement the oral presentation. Overhead projectors are easy to operate, relatively inexpensive, and remarkably flexible in their potential.

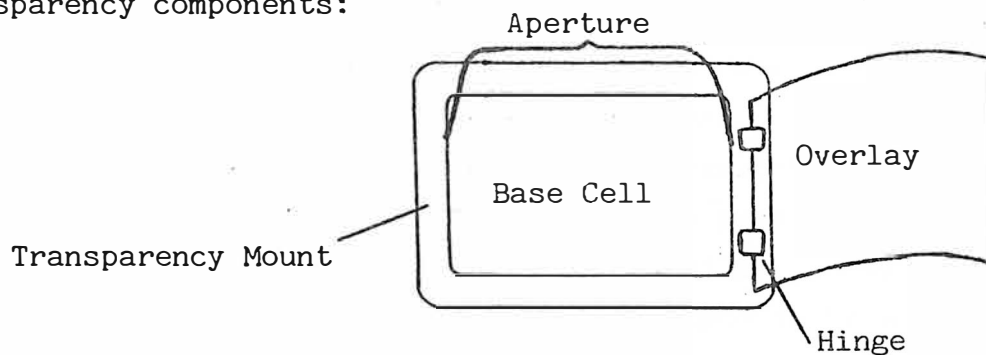
The following merely cites some of their applications and utilization principles. See how many you can add to the list.

### Characteristics of Transparencies and Overhead Projection:

1. Based on principle of direct projection (light from bulb is projected through transparency to screen). Eye contact (visual rapport) can therefore be maintained with class.
2. Normally used in front of the class (projected image should be focus of attention).
3. The distance of the head (containing 2 lens and mirror) from the stage controls focus as projector is moved. The further the projector is placed from the screen, the larger the image.
4. Cellophane roll is often built in so that writing may be done and then removed immediately.
5. Transparency itself can be written on without damage with china marker or felt pen.
6. The stage provides a large aperture (10"x 10").
7. Produces bright image which can be used in lighted room.
8. Horizontal stage provides flexibility as demonstration medium for transparent or opaque (yielding silhouettes) objects.
9. Used frequently as a chalkboard substitute.
10. A still, visual medium, not adaptable to performance or learning involving motion.

Characteristics cont'd

11. Transparency components:



Advantages of Transparencies and Overhead Projection:

1. Teacher made to meet specific needs.
2. Inexpensively prepared.
3. Large selection of commercial transparency masters available.
4. Preserved for future use.
5. Large aperture for easy use and many presentation techniques.
6. Numerous presentation techniques.
7. Projector is simple to operate (only three adjustments: on-off, tilt, and focus).
8. May be used in well lighted room.
9. Presentation sequence easily revised and adaptable.
10. Allows for teacher-pupil rapport and interaction since instructor faces class.
11. Projected transparent images are larger and easier to see than chalk-board images.

Disadvantages:

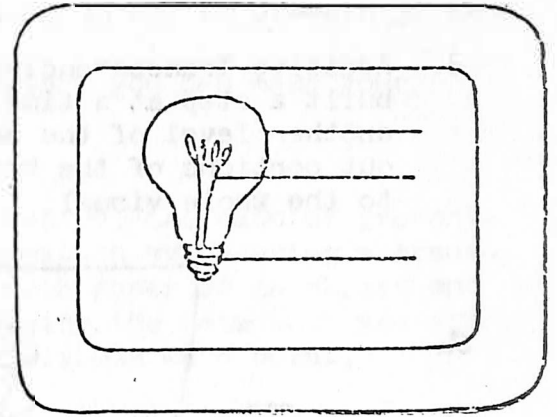
1. Must be supplemented by instructor presentation (will not stand alone).
2. Requires tilted screen to avoid keystoneing.
3. Cannot communicate motion well; still medium only.
4. Frequently overused (as chalkboard substitute).
5. Students view of projected material may be blocked by improper placement of projector.
6. Some commercial transparencies are expensive (\$2 - \$20 each).
7. Multiple layers of transparencies will reduce projected light level substantially.

Presentation Techniques:

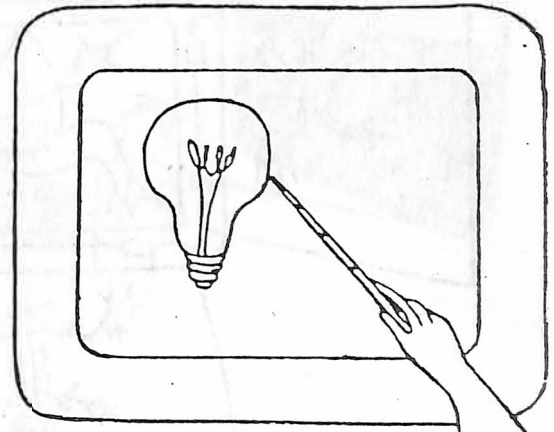
1. **On-Off Technique:** Turn projector on to focus attention on the visual being presented on the screen. Turn it off to refocus attention on the instructor.

2. Presenting Static Transparencies: The static transparency is a still image, all of which is seen on the screen at once. It may be used in the following ways:

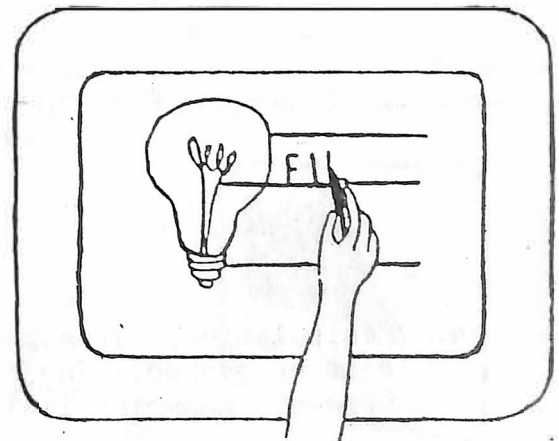
a. Use the On-Off Technique as described in No. 1.



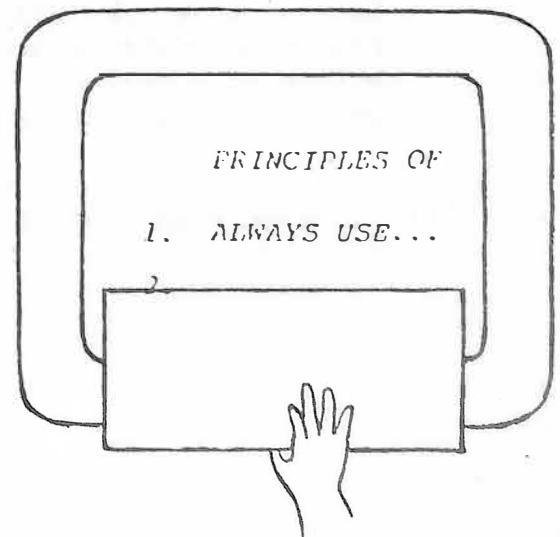
b. Point Technique: Use a pen, pencil, or other object as a pointer on the projector stage. The opaque image created by the pen will direct attention to the appropriate part of the visual. This is far preferable and more effective than trying to point out subjects on the screen.



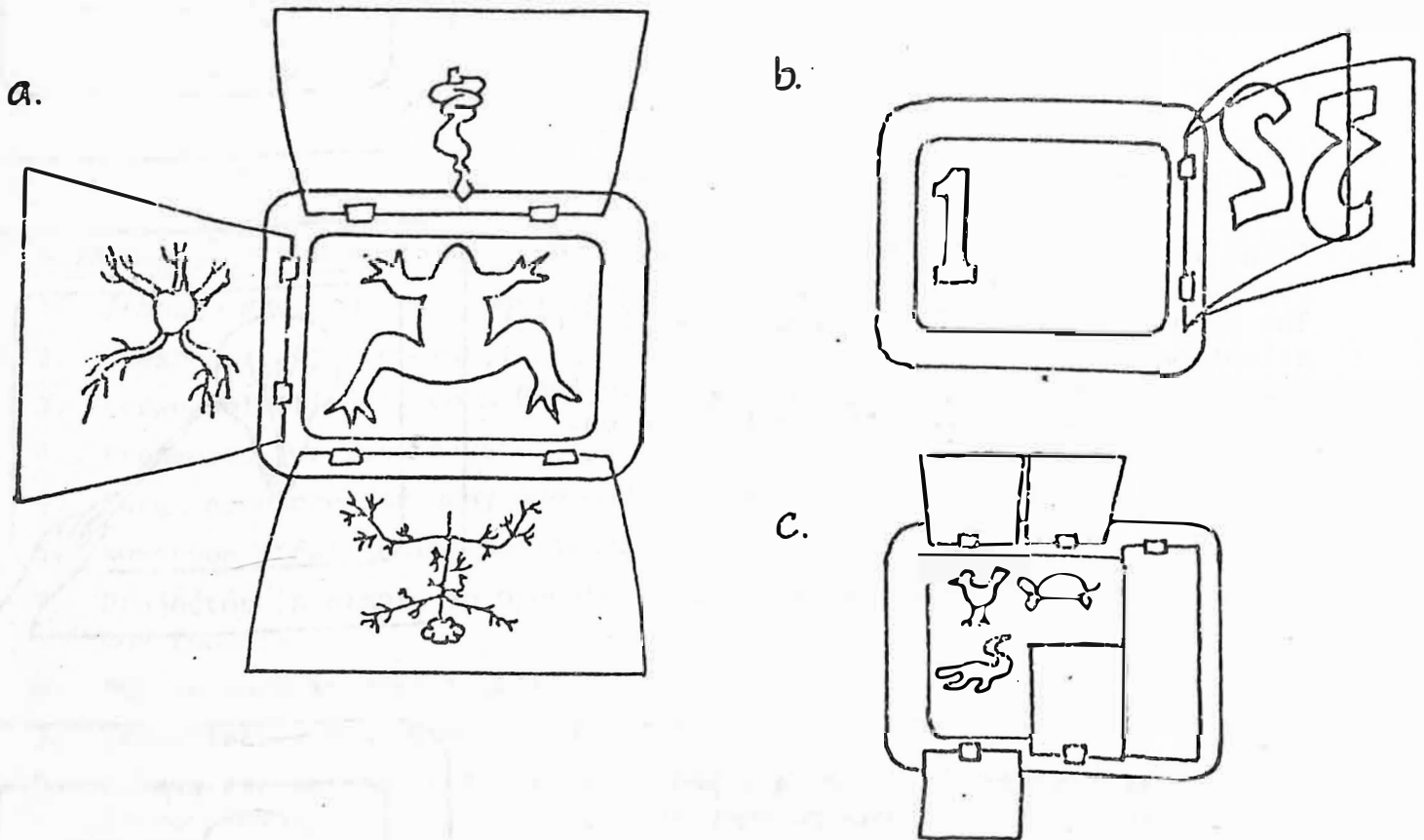
c. Write-On Technique: Use a grease pencil (china marker) or felt transparency pen to add information or emphasize important aspects of a prepared visual. This technique is frequently used without a prepared transparency using an acetate roll attached to the projector. In this case, it becomes merely a chalkboard substitute.



d. Relevation Technique: Place a sheet of paper over the visual to block out light. As you address certain points in your presentation, move the sheet down to reveal the appropriate part of the visual. This prevents the audience from jumping ahead or concentrating on writing down everything presented on the transparency as soon as it is projected.



3. Additive Transparencies: Using overlays, the additive transparency is built a step at a time, each addition visualizing another concept or another level of the same concept. Opaque overlays may be used to block out portions of the transparency. They can be lifted to add information to the whole visual.



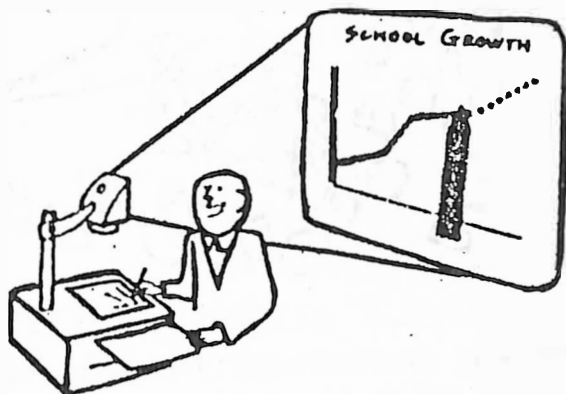
4. Manipulative: Transparencies can be made with moving parts that can be slid or pushed. These parts may be attached or loose, transparent or opaque. Examples include clock face, slide-rule parts, light meter, etc.
5. Controlled Motion: The effect of styled motion can be created using special polarized material on the transparency and an attachment to the projector. The motion is controlled and can show directional flow or motion in a pattern. This requires a polarizing attachment for the projector that is placed over the lens to create the motion effect.

Lets look at some applications of these general techniques. . .

FROM: *Planning and Producing of Audiovisual Materials*, 3d ed. by Jerrold E. Kemp

When showing visual materials with an overhead projector, you can make your presentation effective by using these techniques:

You can show pictures and diagrams, using a pointer on the transparency to direct attention to a detail. The silhouette of your pointer will show on the screen.



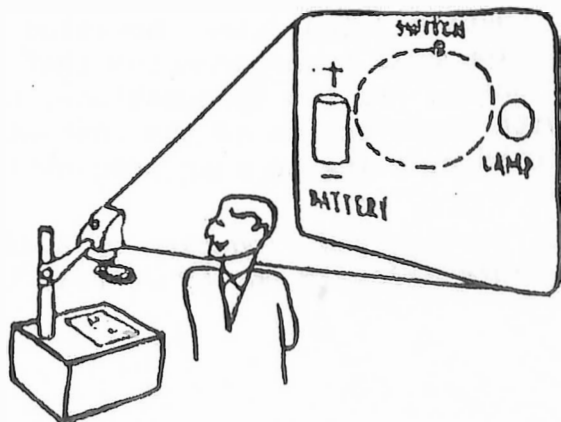
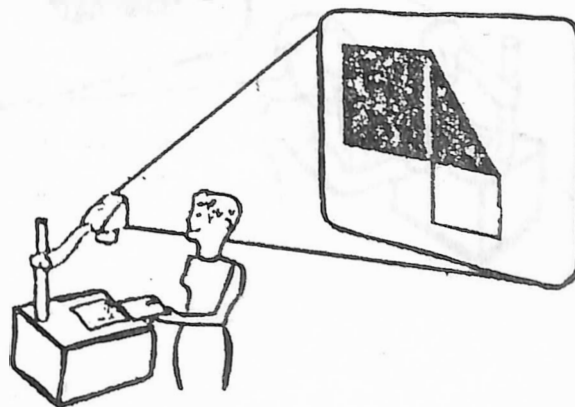
You can control the rate of presenting information by covering a transparency with paper or cardboard and then exposing the data when you are ready to discuss each point.



You can use felt pen or a special pencil to add details or mark points on the transparency during projection.

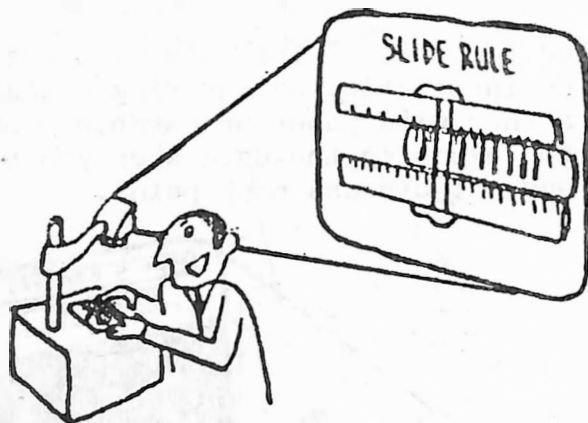


You can superimpose additional transparent sheets as overlays on a base transparency so that you separate processes and complex ideas into elements and progressively present them.



You can simulate motion on parts of transparency by using the effects of polarized light on special plastic with a polaroid spinner.

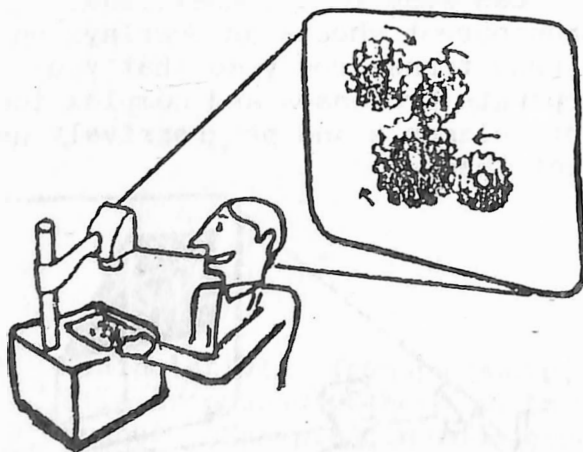
You can move overlay sheets so as to rearrange elements of a diagram or a problem



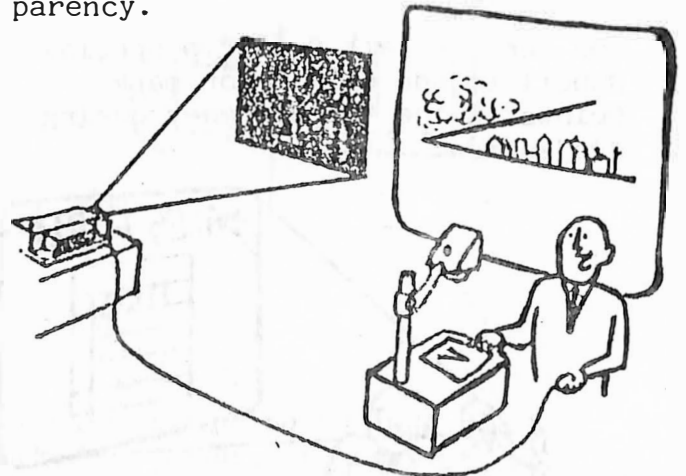
You can duplicate inexpensively on paper the material to be presented as transparencies. Distributing copies to the class or audience will relieve them of the mechanics of copying complex diagrams and outlines.



You can show three-dimensional objects from the stage of the projector -- in silhouette if the object is opaque, or in color if an object is made of a transparent color plastic.



You can simultaneously project other visual materials (slides or motion pictures) that illustrate or apply the generalizations shown on a transparency.



Evidence from research studies reported in Chapter 3 indicates the value of student participation during learning. Develop some transparencies that involve the learner by requiring the completion of parts, replies to questions, or solutions to problems. Or, provide students with paper copies of the content of transparencies and instructions for activities relating to your presentation.

FROM: *Planning and Producing of Audiovisual Materials*, 3d ed. by Jerrold E. Kemp

### Instructional Applications:

1. Cognitive objectives - The overhead is most effectively used when learning objectives are in the cognitive domain. The overhead projector can be used to:
  - a) teach recognition of unfamiliar objects or things
  - b) teach discrimination skills
  - c) show relationships
  - d) show principles of operation
  - e) teach rules, principles or concepts
2. Psychomotor objectives - Use of the overhead projector with psychomotor objectives is limited; however, it can be used to show positions prior to movement, steps during movement and the position after movement has ceased.
3. Affective objectives - Use of the overhead projector generally not appropriate for affective objectives.

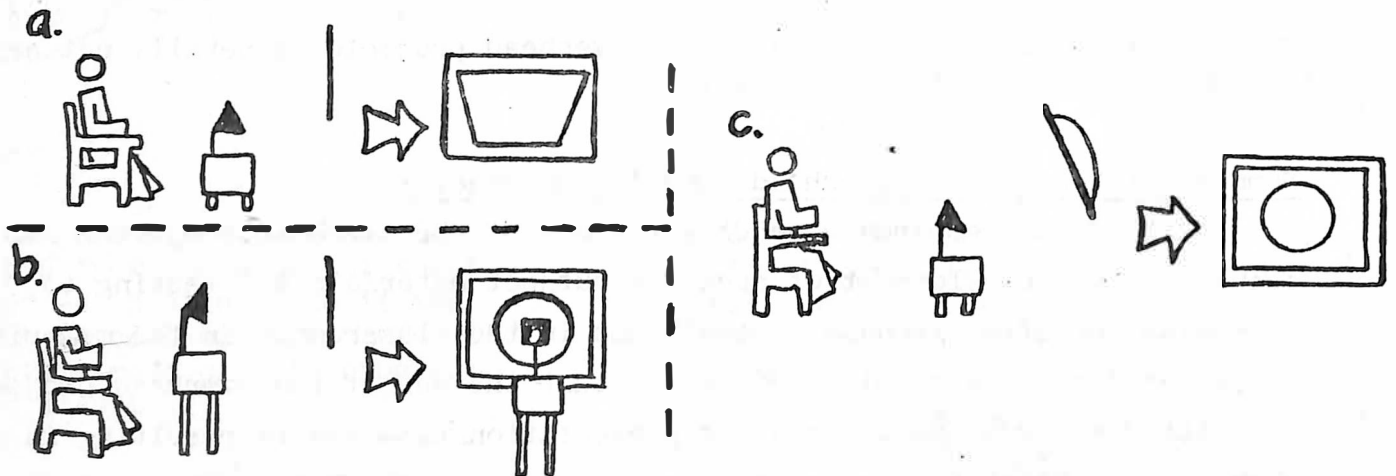
### Summary of Research on Overheads and Transparencies:

Most of the research regarding the use of the overhead projector has focused on the development of specific subject materials and testing to determine the effectiveness of their use in the classroom. In the majority of the studies, the results determined that the use of the overhead projector benefitted instruction by reducing presentation time and by resulting in higher achievement scores in the experimental groups than in the control groups. Other results of studies include:

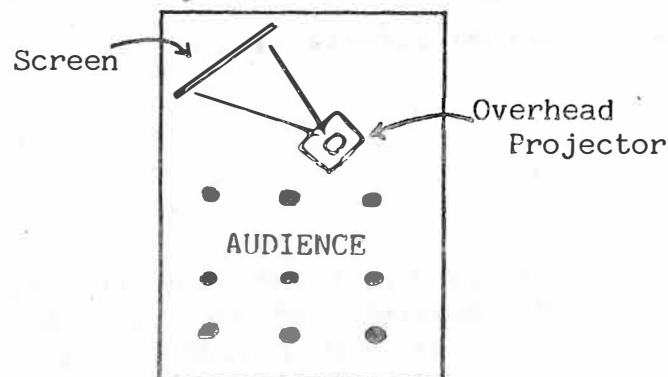
- a) Increased student interest in material presented using the overhead projector
- b) Better retention of material over time
- c) The ease of presenting lessons using the overhead projector for supplement of verbal material.

### Principles of Utilization:

1. Locate and organize transparencies in advance. Insure that the projector you plan to use is working and the stage (fresnel) is clean. Place it in the proper position for normal projection. Focus the projector on the screen. Insure that no one's view of the screen will be blocked by the projector.
2. Use a tilted screen to avoid keystoneing. A keystone occurs when the lens and the screen are not parallel and makes the rectangular image a trapezoid (a). To avoid this, the projector can be raised but then it blocks the view of the screen (b). Both wall mounted and standing screens are available with keystone correction (a support that allows them to tilt) and these are ideal, if possible (c).



3. Position the tilted screen so that the entire audience can see it and so the instructor is not standing in front of it. Normally, the front corner of a classroom is most effective.



4. Turn the light on and off while changing transparencies to avoid distracting glare from screen.



5. Write explanatory or supplementary notes on the transparency frame. This will alert you to special problems or considerations on each transparency.
6. When writing on transparencies, write legibly using large letters.
7. Use color for underlining, circling or otherwise explaining points on a transparency. Emphasize key points.
8. After use, turn the projector to fan only to cool.
9. Store the transparencies in a convenient location (file cabinet) where they can be easily retrieved the next time they are needed.

#### Production:

Creating transparencies. The three ways in which light may be controlled as it passes to the screen lead to three different ways of producing projectable visuals:

1. those in which certain types of opaque materials serve to block out the light and thus produce combinations of outline shadows and light on the screen,
2. those using colored, translucent inks, cellophanes, or foils which alter the color of the light and consequently the resultant image, and
3. those employing patented "Technamation" materials to polarize the light and to suggest motion. Of course, it is possible to exploit various combinations of these characteristics to produce effective visuals.

This course will consider only three methods of producing transparencies. Others exist but generally require more sophisticated equipment and/or techniques to produce. The handmade, thermographic and image lift are appropriate for the beginning student in media production.

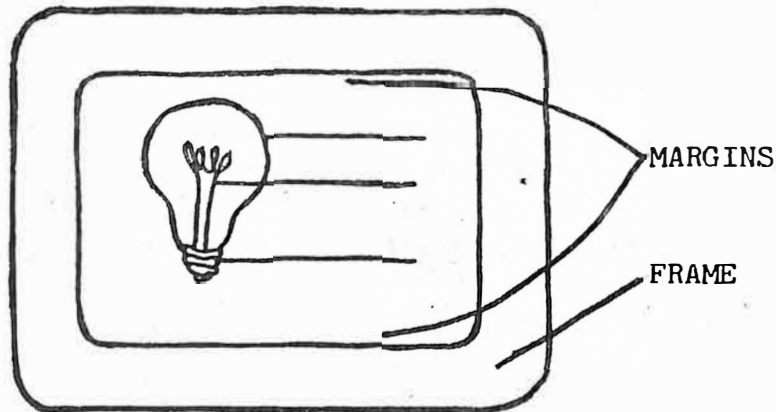
Two other prominent methods are used for producing transparencies. The following descriptions are included only for your information. The processes are described in more detail in several texts listed as Secondary References.

Diazo - This is a light process similar to making blueprints. A special film coated with diazo salts, ultra-violet light, and an ammonia developer are necessary. Equipment for processing diazo transparencies includes a rotary printer-developer combination or a printer with a separate "pickle jar" of ammonia developer: A determined individual can make diazo transparencies using a piece of glass, the sun, and a large mayonnaise jar with a sponge in the bottom. Original artwork nearly always has to be done for this process (some commercial masters are available), but techniques using diazo transparencies are possible that are difficult or impossible with the other types of transparencies.

Photographic - This process is rarely used in local production because of the expense, which is not warranted unless there is a good bit of demand. It requires a large-format camera and 8 x 10" sheet transparency film. Photographic transparencies can be made from materials from books, live scenes, or artwork. The result is the equivalent of gigantic slide (and since 2 x 2" slides are so much easier and cheaper to make, they are normally used instead). Certain Polaroid cameras can also use transparency film, but the resulting transparency is smaller (normally 4 x 5").

### Visual Principles for Designing Transparencies:

1. Keep it simple. Present at most only one concept on each transparency. It is preferable to present a series of transparencies rather than a series of ideas on one transparency. Transparencies should not have a cluttered appearance.
2. Minimize verbiage. Overhead projection is visual medium. Use it to present visualizations of ideas, not quantities of verbal information. If the latter is necessary, consider spirit duplication or some other print duplication method.
3. Provide margins around the edges of the transparency.



4. Whenever possible, transparencies should be produced in a horizontal format. It is more familiar, though not always possible.
5. When using overlays, they should be appropriate, i.e., supplementing, filling in missing information, or providing a new context for the information presented on the base cell. Unless you plan to use overlays, don't produce transparencies that include them.
6. Use color to emphasize key points, make the transparency more attractive or discriminate items, concepts or processes by color coding. Color can be added with felt pens, pressure sensitive acetate, or regular acetate.
7. Combine production techniques. Use the handmade materials to embellish or clarify thermographic transparencies. A simple method is to use coloring books to produce a black-on-clear thermal transparency, shading it in using various colors. Research has indicated that such shaded line drawings are maximally effective. Experiment!

## HANDMADE TRANSPARENCY (Direct Method)

### Assignment #6

This is not any one process, but a shown series of ways to make transparencies without much equipment. Transparent acetate markers (water-soluble or permanent), transparent colored adhesive film, paper or cardboard, and other materials can be used separately or together on plain acetate to create transparencies when facilities don't permit any other process. Transparencies can also be made of frosted acetate in a Spirit Master duplicator; this process is convenient when it is desirable for students to have copies of the material. A fifth process is not simple for local production, but is worth noting.

#### INSTRUCTIONAL OBJECTIVE:

Produce a handmade transparency suitable for overhead projection. The transparency will be produced by drawing, and/or tracing directly on the acetate with permanent (oil-base) and/or temporary (water soluble) markers. Transparent-color contact film and transparent-color tapes should also be used. (Please, NO grease pencil.) At least one form of lettering is required.

#### Materials needed:

- Sheet of clear acetate or X-ray film
- Various water soluble pens (lumocolor or Sharpie by Sanford)
- Dry transfer letters or Leteron letters
- Transparency mounting frame (remember: "window" dim. 8 x 9½")
- Tracing paper
- Lettering devices (see Assignment # 2)
- Pressure adhesive acetate (in colors)
- Transparent tape

#### Production steps:

1. Place mounting frame on tracing paper and draw "window" outline. All artwork must be done within these boundaries.
2. Trace or draw a chart, diagram, or some visual suitable for classroom instruction on the tracing paper. This is your MASTER.
3. Tape tracing paper to table.
4. Position acetate on TOP of tracing paper and tape to table.
5. Using pens trace outline of MASTER on acetate. You can add color with tapes or contact film.
6. Handletter or use stencils, WRICO, United, or dry transfer letters.
7. Mount transparency on frame.
8. Note: Transparency MUST contain tracing, coloring (using acetate or tape), and lettering.

# EVALUATION

Name \_\_\_\_\_

## Scale Range

## Student

## Instructor

0 - 5      Centering of artwork to  
allow framing of trans-  
parency

\_\_\_\_\_

\_\_\_\_\_

0 - 10    Neatness of artwork

\_\_\_\_\_

\_\_\_\_\_

0 - 5      Legibility and read-  
ability of lettering.  
Avoidance of Old  
English, ornate and  
script

\_\_\_\_\_

\_\_\_\_\_

TOTALS

\_\_\_\_\_

\_\_\_\_\_

## Grading Scheme:

18 - 20 = A

16 - 17 = B

14 - 15 = C

(Attach to assignment when submitted)

## IMAGE LIFT

### Assignment #7

This process requires an adhesive acetate sheet, the proper type of picture, and a little strength coupled with patience. Any material printed on clay-coated paper (from glossy magazines, for instance) can be lifted by evenly adhering the picture to the film with a press, a rolling pin, or a spoon. Heat-activated film can be used in a rotary heat or flat dry mount press. Rubber cement can also be used to make a lift. After adhering, the film is soaked in water until the paper dissolves and the clay soaks off, leaving the ink stuck to the adhesive. The resulting transparency is not totally transparent (and, of course, the original is destroyed), but the process is occasionally quite useful.

### INSTRUCTIONAL OBJECTIVE

Produce an image lift transparency suitable for overhead projection, such that a clean and discernable image can be projected. The transparency must be 7" x 9" or larger and have no traces of soap or clay residue remaining.

### Materials needed:

- Claybase\* picture 7 x 9" or larger
- Sheet of lamination film large enough to cover picture
- Sheet of newsprint or release paper
- Tacking iron
- Drymount press or hand iron
- Scissors
- Tray of hot soapy water
- Sponge
- Mounting frame ("window" dimensions are 8 x 9½")
- ¾" masking tape or clear cellophane tape
- Can of clear protective spray (Krylon recommended)

### Production steps:

1. Lay claybase picture on newsprint FACE UP.
2. Cover picture with lamination film - SHINY SIDE UP.
3. a) Tack LAMINATION to newsprint at the corners. Do not draw.  
b) USING RELEASE PAPER: Lay lamination over picture (dull side down) but DO NOT TACK.
4. Fold newsprint or release paper over picture and place "sandwich" in press for one minute at between 270 - 300 F.
5. Remove from press and examine for white spots. If white spots persist replace in press for 30 seconds. Repeat as necessary.

\* CLAYBASE: A claybase picture might be determined by wetting one's finger and rubbing the edge of the page. If a white powder results the picture is claybase. Some claybase magazines: *PEOPLE*, *TIME*, *NEWSWEEK*, *EBONY*, *SATURDAY EVENING POST*, *LIFE* (most photo magazines).

Production steps (continued)

6. If newsprint was used: Carefully tear newsprint away from back of picture.  
If release paper was used: Simply peel laminated picture from release paper.
7. Place picture in tray of warm soapy water for 5 to 10 minutes.
8. Remove from tray, drain, and peel away paper backing.
9. Gently scrub off remaining paper and clay with sponge and hot soapy water. Rinse with clean water.
10. Let dry.
11. Examine image lift on overhead projector or hold against light. If picture does not pass light evenly and the picture does not show clearly, scrub picture back again or start with a new claybase picture.
12. Mount image lift on frame by placing picture FACE DOWN on BACK of frame.
13. Tape all four sides to mount. Black any clear areas between edge of picture and frame with tape.
14. Spray back (dull side) of image lift with clear protective spray.

- - - - -Cut Here and Attach to Assignment When Submitted- - - - -

EVALUATION

Name \_\_\_\_\_

Scale Range

Student

Instructor

0 - 5 Absence of clay or paper. Projects  
brightly & clearly on overhead.

\_\_\_\_\_

\_\_\_\_\_

0 - 5 Clear spray applied evenly. Doesn't  
show runs or sags.

\_\_\_\_\_

\_\_\_\_\_

0 - 5 Absence of holes or clear spots  
indicating complete adhesion.

\_\_\_\_\_

\_\_\_\_\_

TOTALS

=====

=====

Grading Scheme

13 - 15 = A

10 - 12 = B

7 - 9 = C

## THERMOGRAPHIC TRANSPARENCY WITH OVERLAY

### Assignment #8

This is a heat process requiring a special thermal film and a type of photocopy machine commonly available. Transparencies can be made from existing printed matter (including newspapers and xerox copies) and from original work that is drawn in soft (#2) pencil or India ink. This type of transparency is much abused since instructors often make copies of mimeographed sheets and typed copy done with a standard typewriter (you need a carbon ribbon or a carbon copy to use a typewriter). Students past the first row or two are unable to read such transparencies and would be better off if they were given mimeographed handouts. Use of a large-type typewriter, a Varitype machine, or a pen and ink would correct the situation. The major disadvantage of thermal transparencies is they can turn brown from extended use, a hot projector, or being left in a closed car in the summer.

### INSTRUCTIONAL OBJECTIVE

Using handmade masters created with a carbon based substance, produce a thermographic transparency with at least one overlay. The overlay should be purposive, i.e., an appropriate use of the overlay.

### Materials needed:

- Transparency mount
- At least 2 sheets of thermographic film
- Adhesive tape
- Transparency hinges (optional)
- White paper
- Pencil, typewriter, or pen with carbon-based ink
- Ruler, lettering guides, other graphic aids
- Tracing paper

### Production steps:

1. Secure paper to writing surface (with masking tape) and place mount over it.
2. Using graphic equipment, draw or letter on the paper leaving at least a 1" margin on all sides.
3. Draw 2 registration marks in 2 corners.
4. Place another sheet of clear white paper over the first, draw 2 registration marks directly over the first two.
5. Draw or letter the information on the overlay master. This procedure may be repeated for as many overlays as desired.
6. Select the proper setting on the thermofax machine for transparencies.
7. Warm up the machine by inserting a sheet of paper or film until the light and fan just come on. Hold for five seconds.
8. To make transparencies, place the film over the master with the notch on the film in the upper right hand corner and insert in the machine between the guide lines.
9. Repeat the procedure for the overlay.

Production steps (continued)

10. Mount the base cell to the transparency frame using adhesive tape. Trim corners.
11. On the front of the frame, register the overlay(s) and secure on one side only to the frame with hinges or a piece of adhesive tape.
12. Test the registration and functioning of the overlay(s).

- - - - -Cut Here and Attach to Assignment When Submitted- - - - -

EVALUATION

Name \_\_\_\_\_

<u>Scale Range</u>	<u>Student</u>	<u>Instructor</u>
0 - 5 All information centered in mount "window" with a 1" border all around	_____	_____
0 - 5 Base cell and overlays accurately registered	_____	_____
0 - 5 Density of exposed areas	_____	_____
0 - 5 Absence of blobs or blotches on information area caused by overheated film	_____	_____
0 - 5 Meaningfulness of overlays	_____	_____
	=====	=====
	TOTAL	

Grading Scheme:

23 - 25 = A

21 - 22 = B

19 - 20 = C

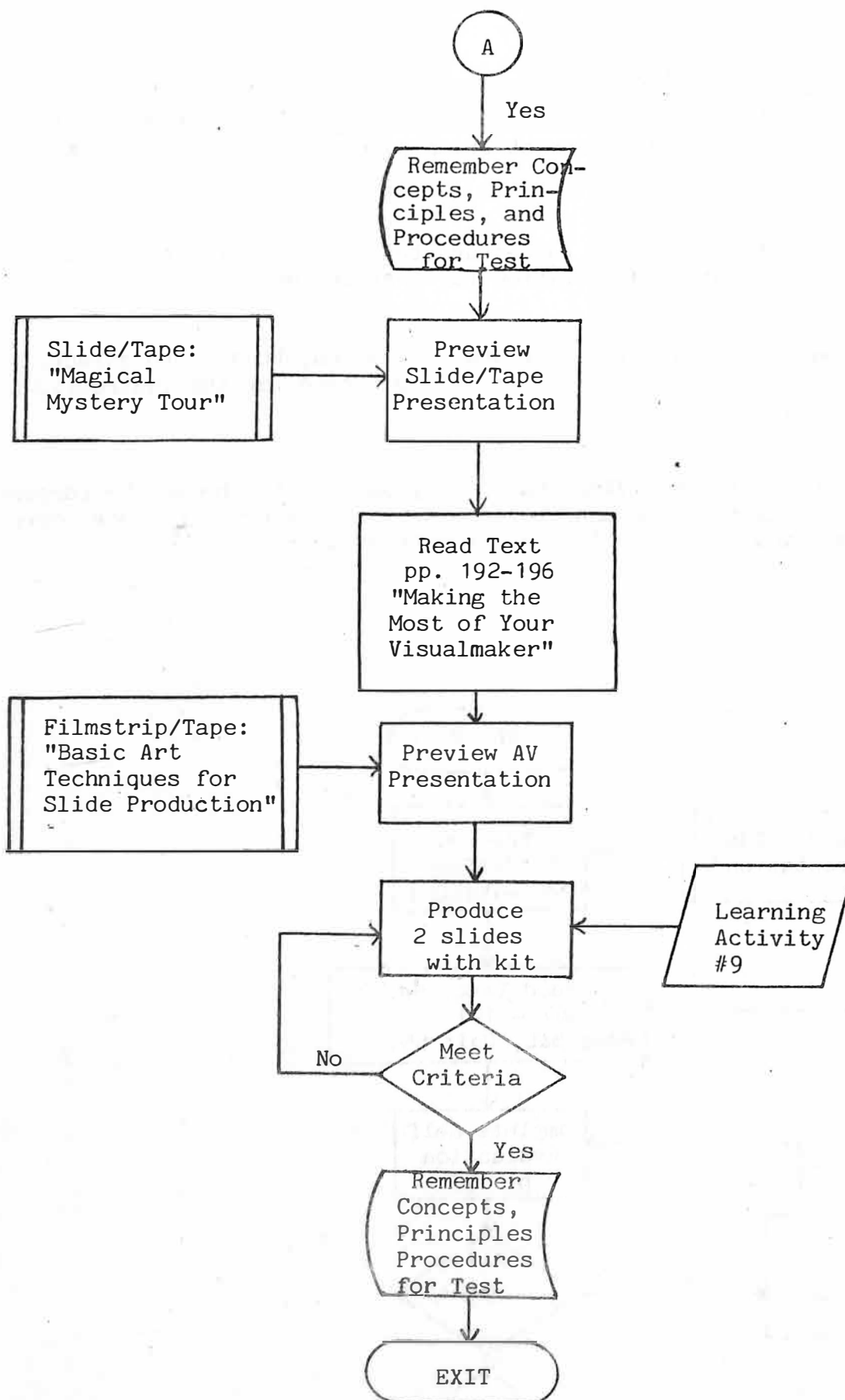


## SELF-EVALUATION

1. In order to make thermographic transparencies, the ink on the master sheet must be
  - a. water soluble
  - b. heat sensitive
  - c. carbon based
  - d. pressure released
2. The type of transparency that is made with a dry mount press is
  - a. diazo
  - b. colorlift
  - c. thermographic
  - d. handmade
3. Which of the following makes an opaque line on a transparency?
  - a. china marker
  - b. translucent tape
  - c. color acetate
  - d. polarizer
4. The irregular shape of the projected image created when the screen is not perpendicular to the line of projection is called
  - a. focus
  - b. distortion
  - c. angularity
  - d. keystoneing
5. Which are the primary applications of transparency overlays?
  - a. exposition
  - b. comparison
  - c. sequence
  - d. inquiry
6. Overhead projection is most appropriate for which type of instruction?
  - a. large group
  - b. small group
  - c. individualized

a . 6  
c . 5  
d . 4  
a . 3  
b . 2  
c . 1

ANSWERS:



## Slides

The use of individual slides or slide series for instruction constitutes one of the fastest growing areas of production and utilization. Slide presentations, frequently combined with synchronized, taped narration, are being produced locally as well as by national publishers on virtually every topic taught in schools. Business managers and industrial trainees are also making widespread use of the medium for sales, promotion and primary instruction on production or office procedures. Whether used individually, as in analyzing a slide of a painting or of oral surgery, or in series, slides are gaining popularity because of their flexibility, realism, and economy.

Slides are a small format (2" x 2" slides are most frequent) transparent projected medium, i.e., a light source is condensed into a beam and projected through the slide and focused on a screen at a variable distance from the slide projector (see Figure 1).

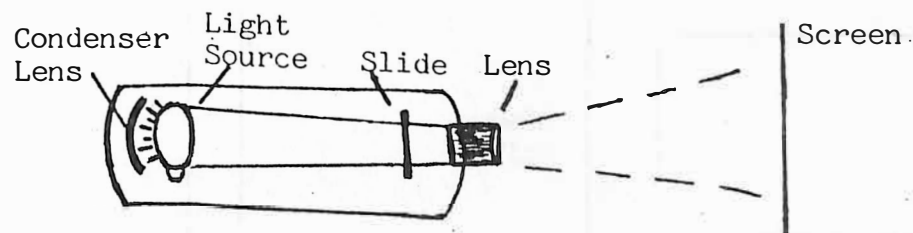


Figure 1. SLIDE PROJECTION DIAGRAM

Slides have a high resolution capability (ability to acutely define or resolve detail from original source) because they are still images usually shot with a technically sophisticated camera. The image recorded on the cellulose (see Figure 2) is usually in color, consisting of a sharp image, producing a realistic replication of the original image.

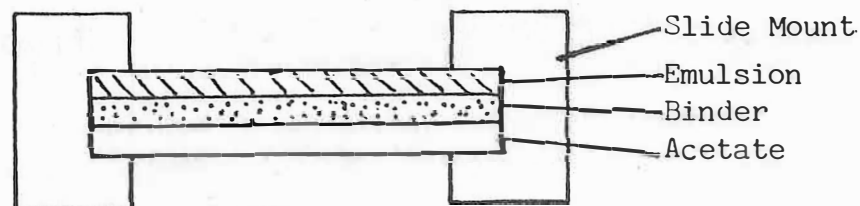


Figure 2. CROSS SECTION OF SLIDE FILM IN SLIDE MOUNT

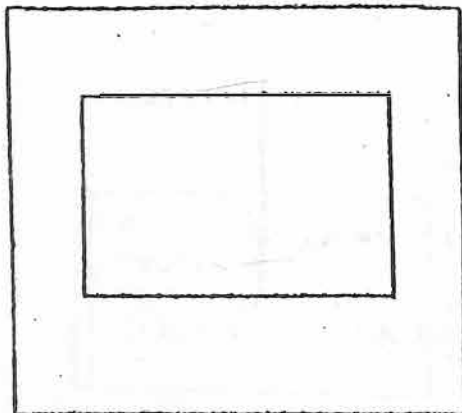
Compared with other media (e.g., film, videotape), slides are very inexpensive. A slide presentation may be produced locally for a few dollars. As a medium of instruction, they are extremely flexible. They are used for individual instruction as well as for small and large group instruction. They may be viewed individually or combined in complex multi-screen multi-image presentations. They can even simulate motion. These characteristics combine to make slides one of the useful instructional media available.

Description of Medium:

2" x 2" slides: (most common formats)

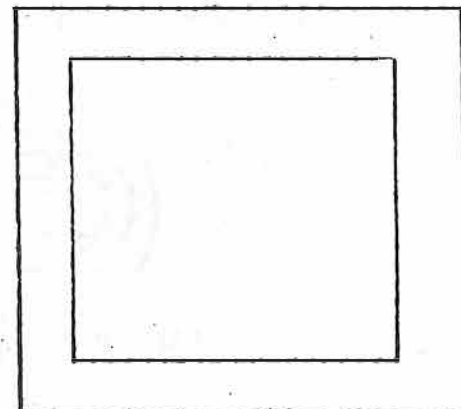
Rectangular

(2 units by 3 units)  
(Aspect ratio = 2:3)



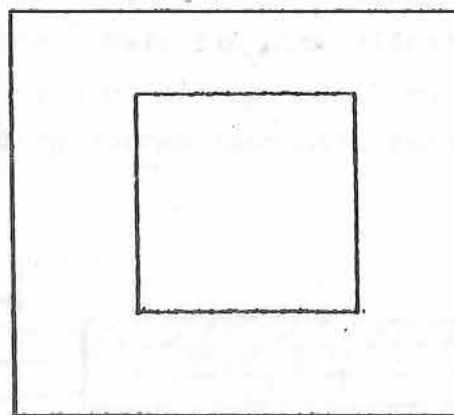
35mm  
Slides

Square Format



Super  
Slides  
(127 film)

Square Format



Instamatic  
Slides  
(126 Cartridge  
Film)

Slide Film

Types:

Kodak Ektachrome - X  
Kodak High Speed Ektachrome  
Kodak Kodachrome

Fugichrome  
3-M Color Slides  
Agfachrome

You'll notice that most of the film names end with chrome. That's because slide films are chromatic, i.e., reversal film. The image is recorded on the film's emulsion and developed into a negative. Normally a print would be made from the negative, but with chromatic films, the image is bleached off the binder and redeveloped (reversed) into a positive image. These films vary in speed (light sensitivity) and color sensitivity. Which you choose depends upon available light and your own preferences. Recommendation: Ektachrome or Kodachrome.

#### Characteristics of Slides:

1. Can be arranged and presented in any order
2. Can be viewed in groups or individually
3. Rate of progress (slide changing) can be controlled by user or by synchronized pulse pre-recorded on tape
4. Require only moderately darkened room
5. Combined effectively with tape-narration
6. Uses direct (straight through) projection to produce an enlarged image on a screen

#### Advantages of Slides:

1. May be locally produced
2. Inexpensively
3. To meet specific needs (adaptable to audience)
4. Easily revised and updated
5. Can be duplicated in large quantities
6. Easily stored in case or slide trap (compact medium)
7. Attracts attention
8. Capable of showing detail (high resolution medium)
9. May be shown at any pace

#### Disadvantages:

1. Requires dimmed lighting in room
2. Delay in having slides processed (usually two to seven days)
3. Inability of slides to show proper spatial relations (2-dimensional)
4. Too much dependence often placed upon slides to "teach"

#### Instructional Applications:

1. Record or pre-record field trip information to use in class
2. To teach sequential processes and procedures (e.g., how to record data, how to operate a machine)
3. Promotion, public relations (changing affective behavior)
4. Teaching concrete concepts (visualization)
5. Reviewing subject matter
6. Documenting events or objects
7. Student produced presentations (show-n-tell)
8. Stimulate appreciation

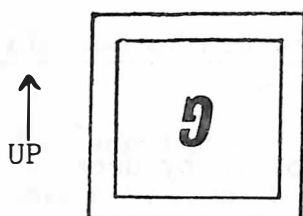
## Instructional Applications (cont'd)

9. Focus group attention
10. Supplement other

Because of their flexibility, slides are applicable to many instructional purposes.

### Principles for Utilization:

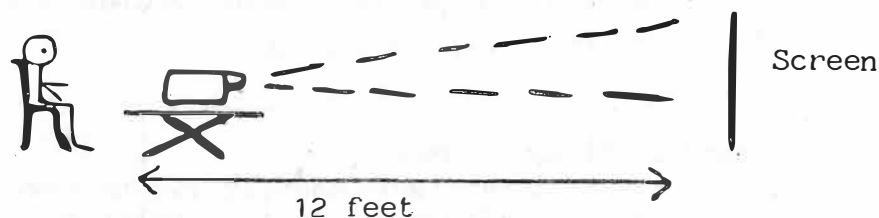
1. Avoid using Kodak Carousel 140 trays (accommodating 140 slides) because slides jam too easily.
2. Insert slide in tray or projector so that it will project correctly. Facing the screen from the back of the projector, invert the slide with the processors label toward the screen.



(correct orientation as slide goes into projector)

The image is inverted by the lens.

3. Without a zoom lens, move projector away from the screen to increase the size of the image (resulting in dimmer image) and toward the screen to decrease the size of the image (with an increase in brightness). Why is this? The same effect can be accomplished by using a wide angle projector lens to enlarge image or a narrower angle (telephoto type) lens to reduce image size without moving the projector.
4. Size of the image should be large enough to be seen clearly by person farthest from the screen. A rule of thumb says that one foot of screen width is required for each six feet of viewing distance from the screen.



How wide should the image be on the screen? If you think 2 feet, you're correct.

5. For the brightest image using front screen projection, use a glass beaded screen. Front projection should be used for large group instruction.

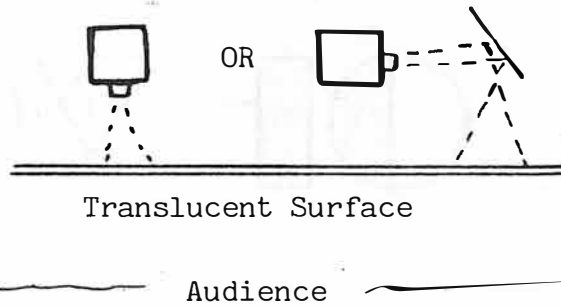
### Reflective Surface (Screen)



Audience

Principles of Utilization (cont'd)

6. For rear screen projection, you must dim the room lights even more. Rear screen projection is most common in small slide viewers of individualized instruction equipment (e.g., Caramate).  
Caution: Slides projected must be turned around (processing label away from screen) or they will appear backwards. Check it out.



# MAKING THE MOST OF YOUR

*In the following article, Mr. Gardner provides some thorough guidelines for using the Kodak Ektagraphic Visualmaker. Readers are also referred to a two-part article entitled "Copyright and the Copystand" which appeared in the Copyright Today department of the October and November 1975 issues of Audiovisual Instruction. It would be a good idea to re-read this department before copying illustrations or photographs from a book, magazine, or newspaper, that may be copyrighted to determine if your use falls within the legal realm of "fair use."—Ed.*

Many innovations are like flash powder—one bright light and then they're gone. Two notable exceptions of the last decade, at least from the standpoint of the classroom teacher, have been the cassette recorder and the Kodak Ektagraphic Visualmaker. Both help fill a communication need, are relatively inexpensive, simple to operate, and give an almost 100% guarantee of a usable product. Unfortunately, the potential of the Visualmaker is not as well known to the average teacher. What the cassette recorder can do for recorded sound, the Visualmaker can do for recorded sight. What better partners could you ask for?

Since the Visualmaker has been around for some time, the chances are very good that there is one already in your school or at least several in your district. Hopefully, you know this to be the case and have used one on several occasions. In any event, the tips and suggestions given here should prove very helpful for future applications.

## Basic Equipment and Supplies

A logical start would be to get acquainted with the equipment. The Visualmaker kit consists of a Kodak Instamatic X-35 camera and two copystands on which the camera may be mounted for closeup pictures.

The closeup capability is provided by a special lens built into each copystand; a single Magicube flash provides all the needed light. Thus no adjustments for light or focus need to be made by the photographer. One copystand provides for photographing an area approximately eight inches square; the other an area approximately three inches square. The decision as to which stand is best for each occasion and its proper alignments are really the only variables which give the user any concern.

As for the supplies, let's begin with the film. Normally, slides are the desired product. So, a 20 exposure roll of Kodachrome 64 or Ektachrome 64 in the 126 instamatic size should be procured. Of course, there are other fine companies besides Kodak that make film for instamatic cameras. If your purpose is to have prints instead of slides, then load the camera with either a black and white or color print film.

Next, you will need a sufficient number of flashcubes to expose your roll of film. The original model of the Visualmaker uses the regular flashcubes, but you are far more likely to encounter the later version which uses the new Magicubes. Be sure to check first to see which you will need



# VISUALMAKER

by C. Hugh Gardner

as they are not interchangeable. If your unit has the X-35 camera, it will need the Magicubes. To help in framing and composition, several sheets of different colored construction paper, a ruler, and a sharp knife are desirable.

## Setting Up Equipment

The first step is to load the film into the camera. As you do this, inspect the interior of the camera. Blow away dust and wipe the inside lens if it is smudged. Finish up this housekeeping task by checking, and cleaning if necessary, the outer surface of the camera lens and the lenses of both copystands.

Let's begin by using the large stand. Open it up, and be sure to snap the side braces into their locking slots. Leave the focus setting at the beyond six foot position on the X-35 camera. Place the camera lens into the open ring of the copystand lens and secure the camera with the tripod locking screw. Now insert a Magicube. If you have advanced the film to the first position, you are ready for your first shot. Place the stand on top of your desired copy. Alignment of the copy is accomplished by observing the U-shaped opening of the stand legs. Do not look through the camera viewfinder as it is of no value when the camera is mounted to the stand. Steady the stand by placing one hand on top of the camera and then use a finger and thumb of the other hand to "squeeze off" the shutter release lever. A click will be heard and the flash should go off.

Next, stroke the film advance lever one and one-half to two strokes until it stops. This will move the film to the number two position and rotate the flashcube to a fresh side. As you take the rest of your pictures, remember to put on a new flashcube after every four snaps.

## Framing the Shot

Now for some more technical information. Said simply but somewhat inaccurately, the area between the stand legs will be photographed by the camera. The hitch is that the camera actually "sees" less than this area by about a half inch on the three sides surrounded by the metal stand. The bottom of the photographed area for the fourth side or open end is just about even with the tips of the side legs. If this seems like an engineering mistake, just remember that you wouldn't want to see the edges of the stand photographed onto your slides. For the same reason, don't draw border lines at this half inch point or try to cut copy exactly eight inches square. If you do, you will wind up seeing lines or table tops on the edge of your slides. The safest practice is to let the picture or background paper "bleed" out to at least the inside edges of the stand. The photographed area will be less than this, but you won't have to worry about predicting the exact point.

Now for a second consideration about framing—the composition of the finished product. Generally speaking, important aspects of the visual, such as parts of a diagram and titles, should not extend

to the very edges of the projected slide. So back to the old drawing board. When using the large copy-stand, important copy should not be more than seven inches square. In other words, you are now subtracting another half inch from all four sides of the photographed area. This may not seem too confusing, but in actual practice it is difficult to visualize all of these considerations. The solution is to cut a piece of posterboard according to the dimensions shown for the large mask in Figure 1. By placing the mask on top of the stand legs you can now arrange your composition as you would like the finished slide to look. Remove the mask before snapping the picture and this difficult situation has become easy.

Figure 2 shows the mask for the large stand in use. Note that the mask fits under the side braces and is pushed all the way to the vertical edge of the back frame. By constructing the mask out of a flexible material, it can be "bowed" at the center and moved upward if loose materials or tile letters are used.

A similar mask can be made for the small stand,

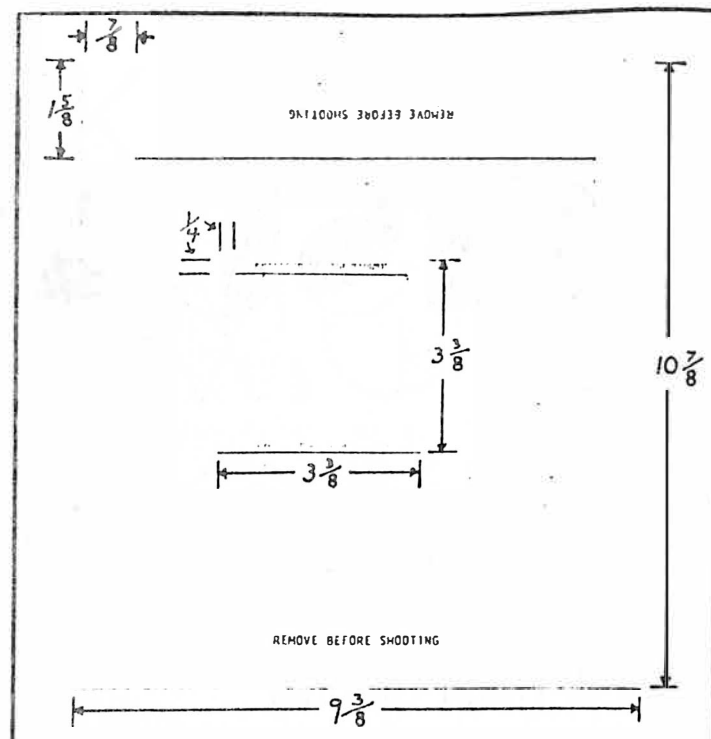


Figure 1.

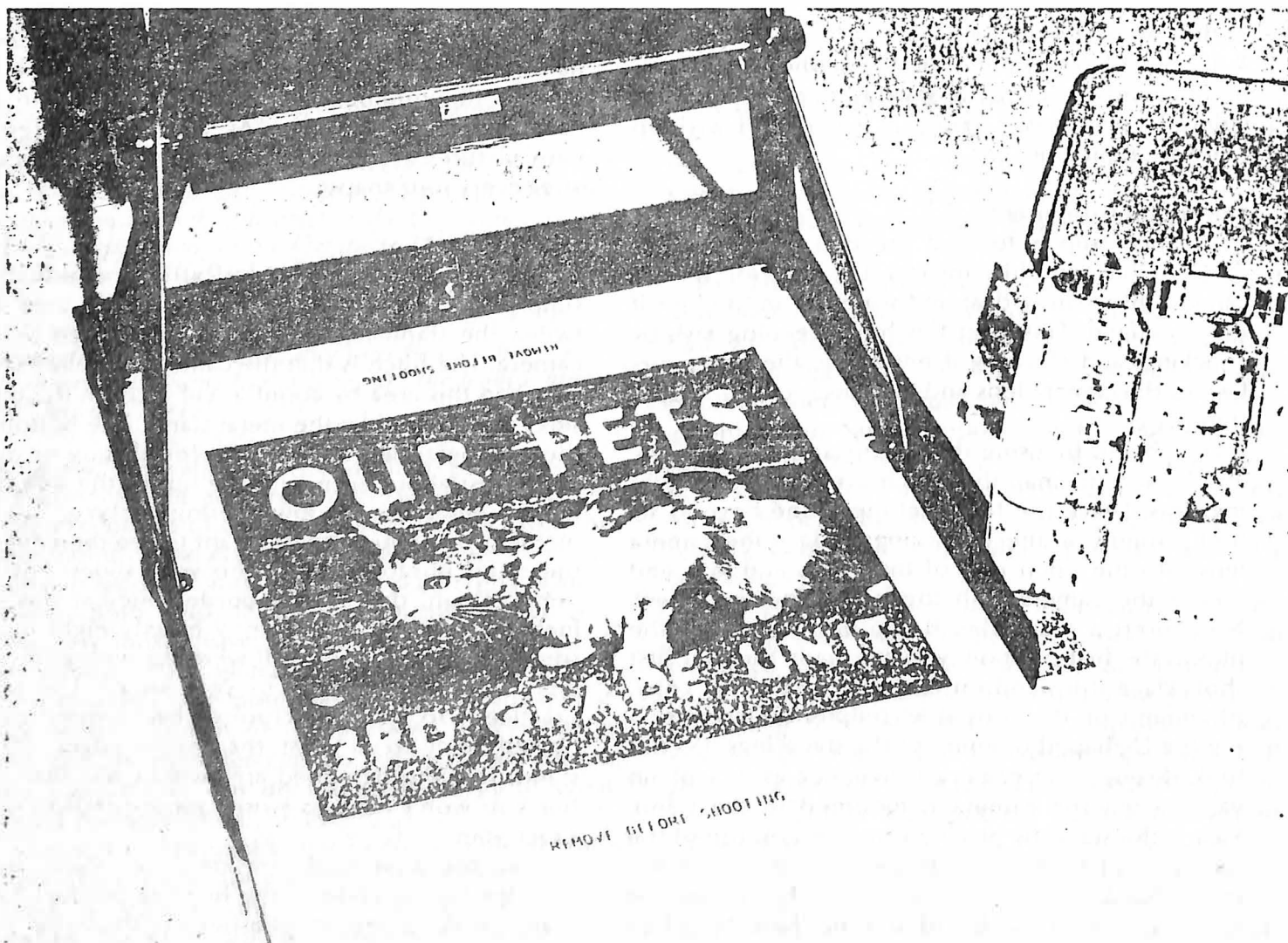


Figure 2. Using the large stand with a masking guide.

but since all dimensions are magnified at this close range, subtract only one-quarter inch in both cases. Figure 1 also gives the proper dimensions for the smaller mask and Figure 3 shows it actually being used.

After some trial and error you may have to change some of the mask dimensions slightly for your particular Visualmaker. Slight variation is the penalty that must be paid for mass produced, low cost copy equipment.

### Selecting the Copy

The simplest and perhaps most useful way to use the copystand is to make slides from photographs, drawings, illustrations, and diagrams from such sources as books, magazines, and circulars. Many different visuals may be brought together in a slide set and the uniformity of slides taken with the Visualmaker will belie their scattered origins. Labels may be laid on top of a picture before photographing and a specific part of a photo or diagram can be permanently indicated on the slide by laying a cut paper arrow in the appropriate place on the original.

The Visualmaker also makes it possible for teachers and students to prepare and photograph original artwork. Slides can be used to ask questions, summarize, give directions, mark divisions in material, or direct students to the next activity. They may be made, usually for the eight inch copystand, with crayons, felt tipped pens, die-cut letters, or clippings from printed copy. This artwork should be done in colors that are in strong contrast to the background shade—white on dark colors photograph better than pastels. A standard typewriter may be used to add written copy for the three inch stand format and a primary-faced typewriter can be used for the eight inch format.

The Visualmaker copystand can also be used to photograph some three dimensional objects. Such objects may cast a shadow toward the open end of the copystand, but pictures can be planned so the shadow does not interfere or so it enhances the effect. If you would prefer to minimize the shadow, try holding a piece of white typing paper just outside the picture area at the open end of the stand. By leaning it in at the top toward the camera, you can reflect some flashcube light back toward the shadow areas.

The Visualmaker is especially suited to photographing specimens—insects, leaves, rocks, soil samples, and cultures. It can also be used to photograph small artifacts, pieces of equipment, and even closeups of a process such as dissecting a frog. The eight inch stand has an amazing amount of focus tolerance. Nothing needs to be done differently if an object is less than one and one-half inches thick,

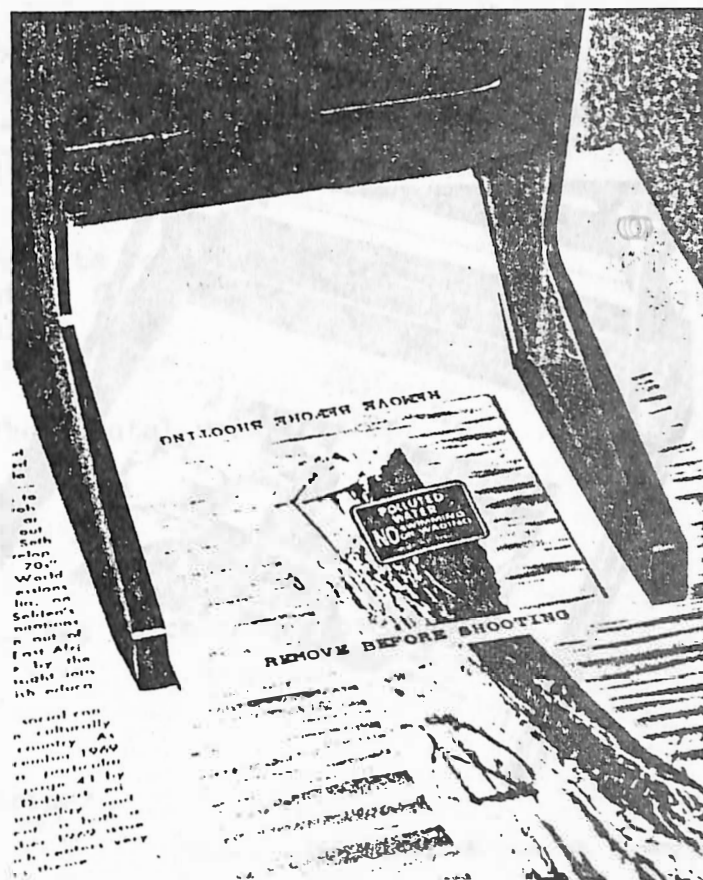


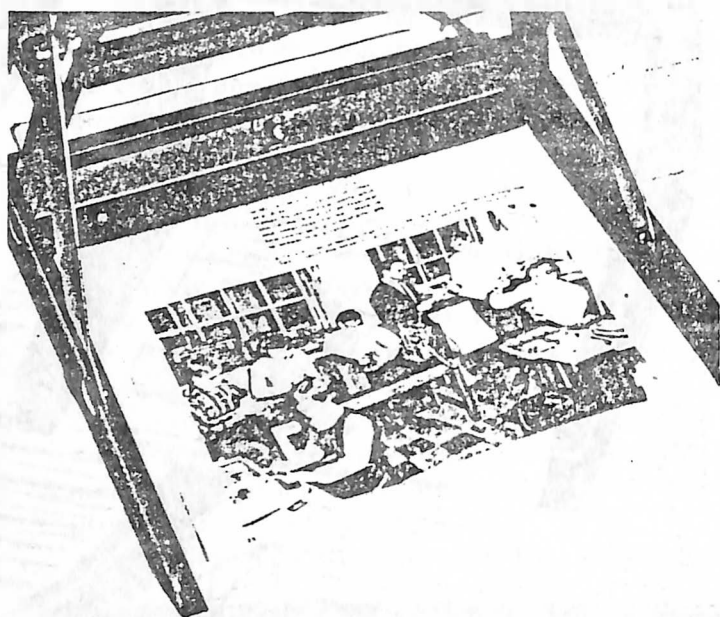
Figure 3. Using the small stand with a masking guide. (Be sure to remove masking guide before shooting the picture.)

but even objects two to three inches deep can be successfully photographed if the stand is positioned so that the normal focus plane cuts through the approximate middle of the object. A similar focus tolerance on the three inch stand is about one-half inch.

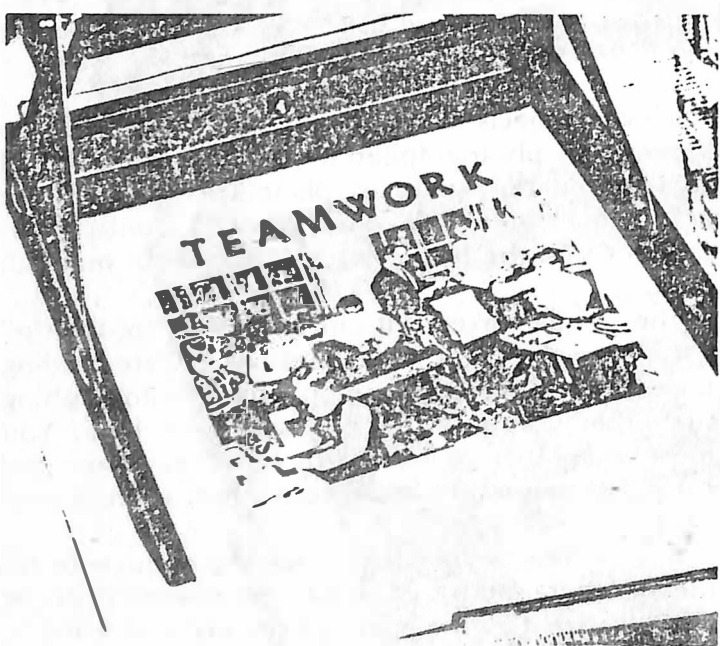
The Visualmaker kit includes a "pistolgrip" handle for the eight inch stand to facilitate holding the stand in a vertical position when photographing such things as growing plants or tree bark. You must remember to use flash, however, when the camera is mounted on the copystand, even in sunlight.

If a picture or drawing is not big enough to fill the photographed area, it can be mounted on or framed with colored paper. Let's say you want to photograph a picture printed in a book which measures five and one-half inches by six and one-half inches. The use of the three inch stand would cut out too much of the wanted area and, of course, the eight inch stand would photograph unwanted items surrounding the picture. The solution is to select a pleasing color of construction paper and with a ruler and sharp knife, cut an opening slightly smaller than the picture (in this case about five inches by six inches). If you place the mask on top of the picture and under the legs of the copystand, a very satisfactory slide can be produced from the

picture. Figure 4 illustrates this often encountered problem and Figure 5 shows its simple but attractive solution with a construction paper mask and tile letters.



*Figure 4. An undersized picture without a mask.*



*Figure 5. An undersized picture with appropriate mask.*

### Other Applications

The Visualmaker camera can easily be used off the copystand. Since it has an electric eye which makes outdoor light setting automatic, even elementary age students can use it with success. It should be noted that the electric eye is powered by a battery which must be in working condition. If your camera fails to indicate a need for flash on indoor pictures, you can suspect that the battery is either weak or corroded. If the camera is used in-

doors, a distance of twelve feet from the subject is maximum for a good flash exposed colored slide.

Slides made without the stand—people, machines, signs, buildings—can be combined with those made on the stand. Missing pictures in a slide set made on the scene can often be filled in by copying a flat picture from a book or magazine.

The ease of making slides with the Visualmaker opens many instructional possibilities. One application often overlooked is using slide sets to give demonstrations of how to do something, such as use a slide rule, thread a projector, put in a zipper, or clean a sparkplug. Such slide sets can prove invaluable to the teacher who uses a highly individualized or learning station approach.

This concept of a slide-sound set brings us full circle back to the cassette recorder. Hopefully, you have made a decision in the interim to begin harnessing up this communication team. A curriculum designed to meet the needs of our complex world requires both pictorial and verbal communication. No longer can we afford the inefficiency that has characterized our traditional efforts to tell the learner what we want him to understand.

*The author is Assistant Professor of Media at the University of Georgia in Athens, Georgia.*

## SELF EVALUATION

1. Which of the following states an accurate relationship?
  - a. 2 slide frames equals one filmstrip frame
  - b. 2 filmstrip frames equals one slide frame
  - c. slide and filmstrip frames are equal size
2. The correct aspect ratio (vertical/horizontal relationship) for 35 mm slides is:
  - a. 4 x 5
  - b. 3 x 4
  - c. 2 x 3
3. Instamatic cameras, using 126 film, take which shaped picture?
  - a. square
  - b. rectangular
  - c. round
4. Which is not an advantage of filmstrips?
  - a. Permits pacing
  - b. Inexpensive
  - c. Fixed sequence of pictures
  - d. Easily stored
5. Slides projected by rear-screen are projected onto which type of surface?
  - a. opaque
  - b. translucent
  - c. transparent
6. A popular method of scripting slide presentations is known as:
  - a. storyloading
  - b. scenario
  - c. plot sequencing

Answers: 1. b 2. c 3. a 4. c 5. b 6. a

## BEHAVIORAL OBJECTIVE

Given an Ektagraphic Visualmaker kit, 126 cartridge film, flash cubes (when necessary) and a visual (8 x 8" or larger), the student will produce two 2 x 2" slides of the SAME picture, one using the 8 x 8" copystand and one (close-up) using the 3 x 3" copystand. Criteria are stated below.

## Material needed:

picture - 8 x 8" or larger

Ektagraphic kit:

camera

flash cubes (when required)

slide film (126 - Instamatic)

copystands

sheet of black paper or tagboard

## Production steps:

1. Load film in camera
2. Mount loaded camera on TALL stand
3. Place flash cube on camera
4. Center picture with 3-sided base of copystand.
5. Depress shutter and expose film
6. Mount camera on SMALL stand
7. Cock shutter
8. Center small stand on part of picture you wish to copy  
(base of stand delimits boundaries of picture)
9. Depress shutter and expose film

(Cut here and attach to assignment when submitted)

Name: \_\_\_\_\_

## EVALUATION

Scale RangeStudentInstructor

- 0 - 1 Proper exposure of film (did the flash fire?)
- 0 - 1 Proper framing of slide (parallel edges and level horizons)
- 0 - 1 Sharpness of picture (did you move stand when you tripped the shutter?)

TOTALS

## Grading Scheme:

3 = A    2 = B    1 = C



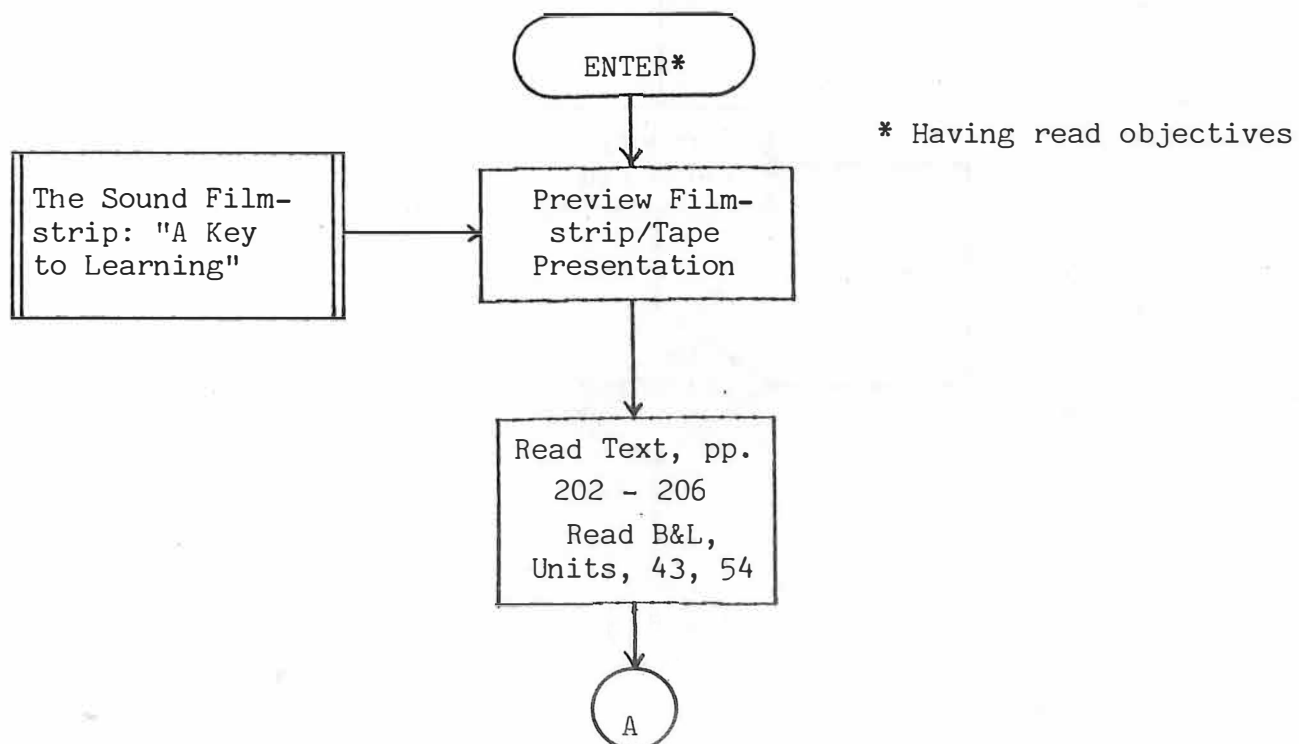
## FILMSTRIPS

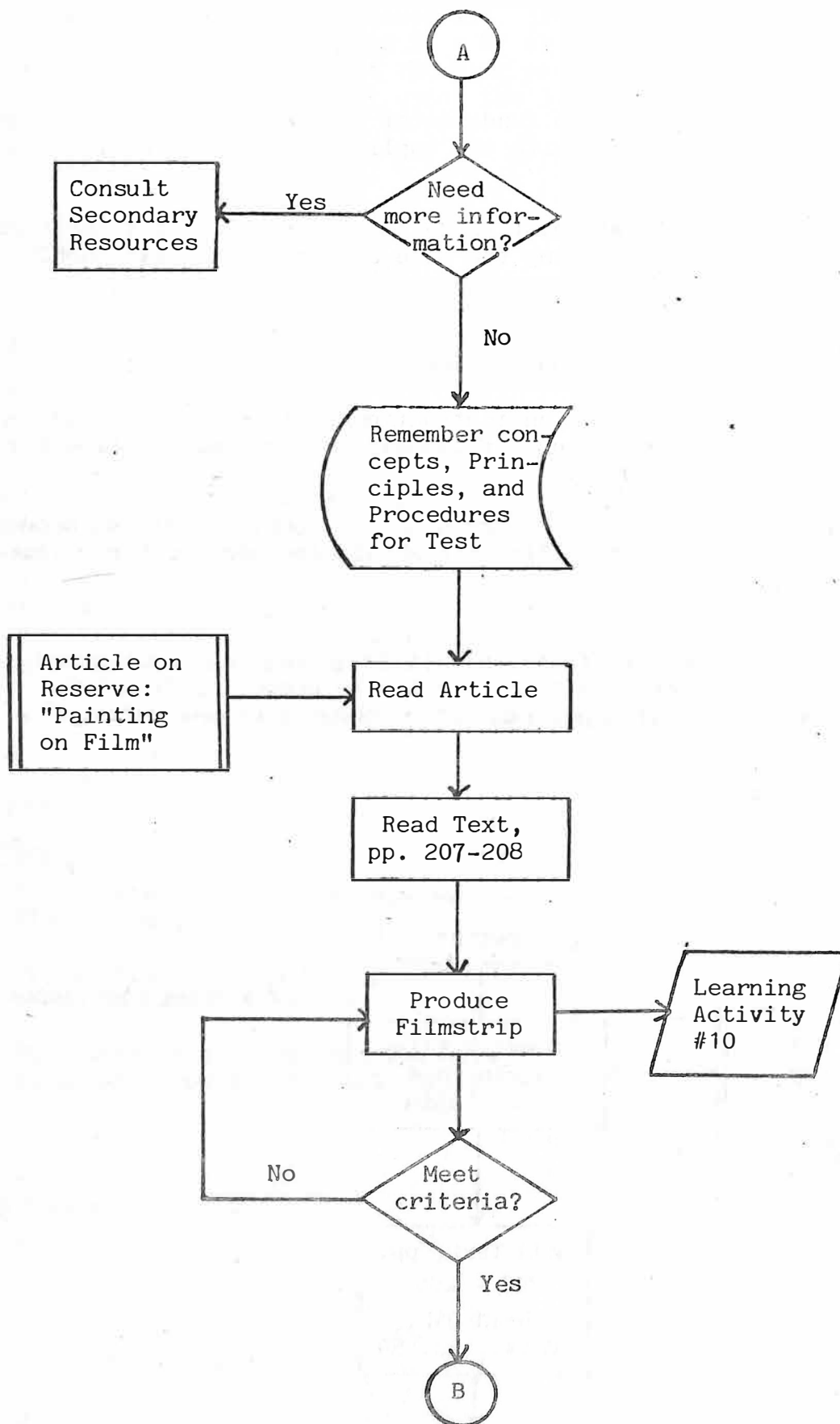
### Instructional Objectives:

1. Be able to cite at least two fundamental differences between filmstrips and slides for instruction with the implication of each difference for instruction.
2. Be able to demonstrate at least three characteristics of filmstrips as instructional media, including the size and position relationship to 35mm slides.
3. Be able to list at least three advantages and two disadvantages of the filmstrips as an instructional medium.
4. Be able to plan and conduct an instructional sequence into which you could appropriately implement a filmstrip, evaluating its effectiveness as an instructional medium.
5. Given a piece of clear 35mm leader and felt pens, be able to produce ten frames in length. The filmstrip should meet the criteria list in the learning activity.

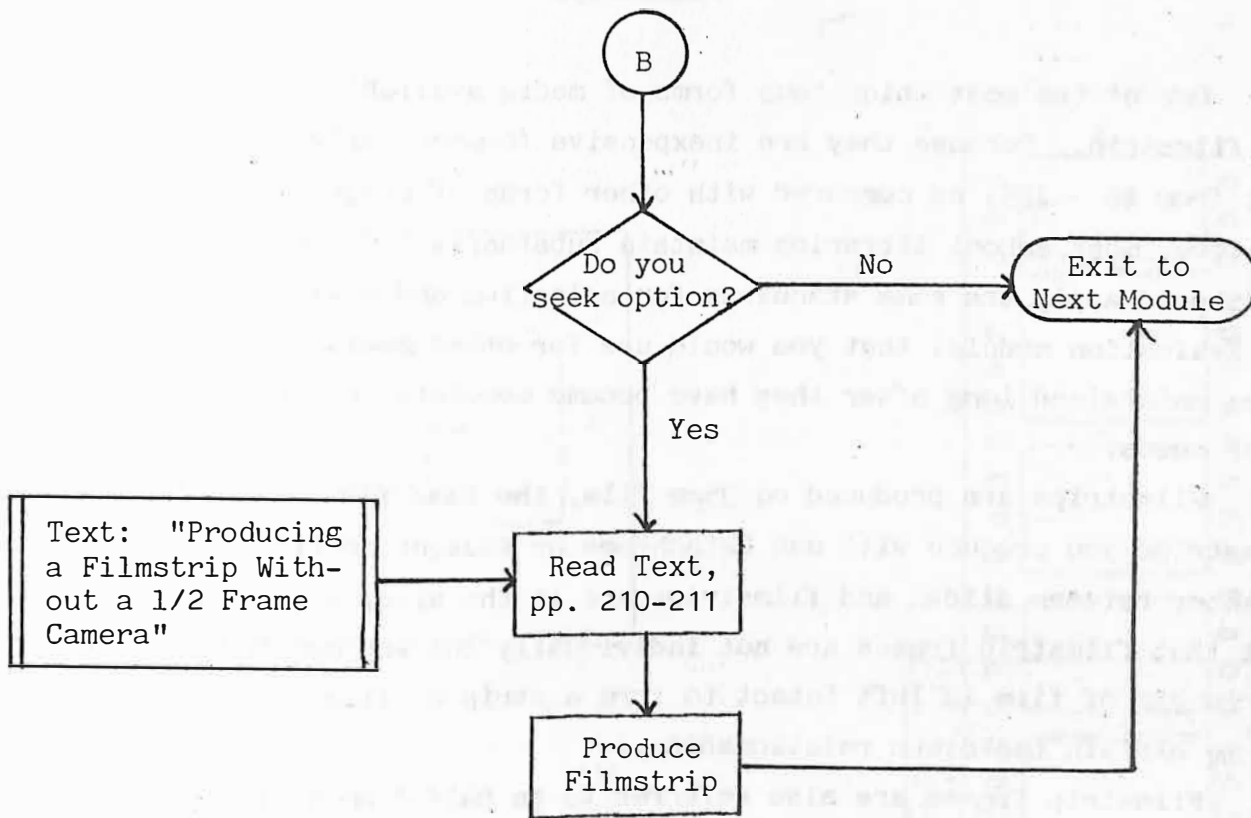
Optional: Given a 35mm full frame or half frame camera, light stand, exposure meter, and film, be able to produce a filmstrip with consistent exposures and a cohesive visual theme.

### Task Sequence:









## Filmstrips

One of the most ubiquitous forms of media available in schools today is the filmstrip. Because they are inexpensive (commercially produced filmstrips cost from \$6 - \$25) as compared with other forms of projected media and easy to store, most school libraries maintain substantial collections. Beware! You should apply the same standards for selection and evaluation (see Selection and Evaluation module) that you would use for other media. Filmstrips are often maintained long after they have become obsolete or irrelevant to curricular needs.

Filmstrips are produced on 35mm film, the same film used for 35mm slides. Filmstrips you produce will use Ektachrome or Kodachrome film. The only differences between slides and filmstrips are in the size, aspect ratio, and the fact that filmstrip frames are not individually cut and mounted like slides. The length of film is left intact to form a strip of film, ergo, filmstrip. Let me explain the other relationships.

Filmstrip frames are also referred to as half-frames, i.e., one half of a full 35mm frame. So to produce a filmstrip, you need a half-frame camera (an alternate method is described in "Filmstrip Production Without a Half-Frame Camera").

A half-frame camera exposes a frame that is only one half of the size of a normal 35mm frame. This frame is horizontal across the film as opposed to horizontal with the film as in slides.

Having a full frame with a 2 x 3 aspect ratio (height to width ratio) yields two frames with a 3 x 4 aspect ratio.

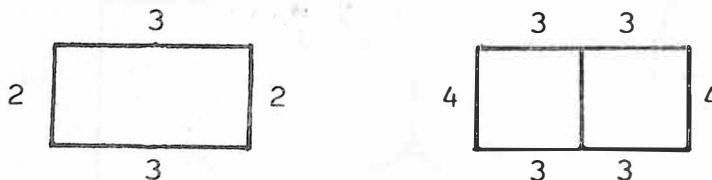


Figure 1. Slide - Filmstrip Aspect Ratio Comparison

So the fundamental relationship that exists is that two filmstrip frames equal one 35mm slide frame.

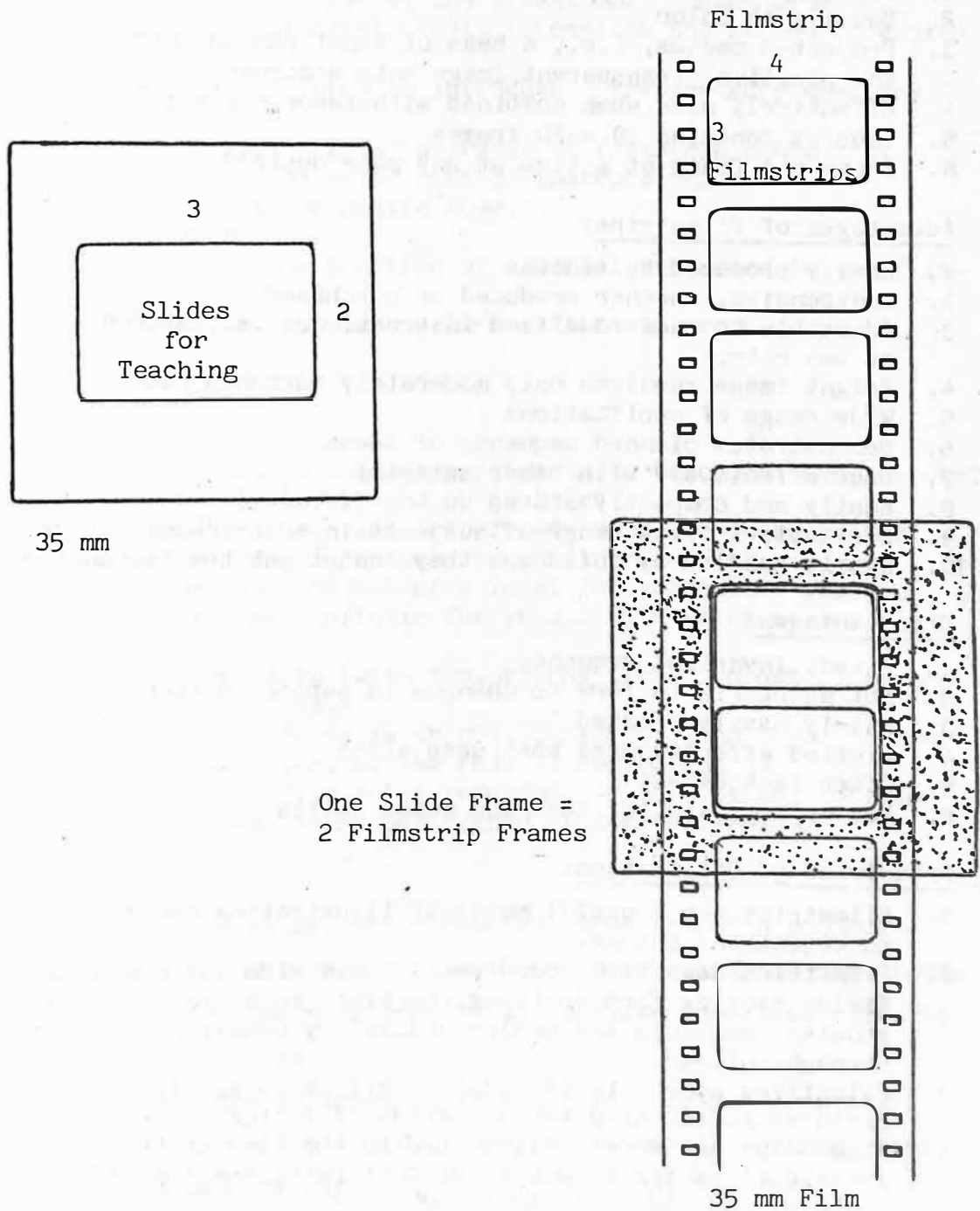


Figure 2. Filmstrip-Slide Comparison

### Characteristics of Filmstrips:

1. Frames presented in sequential order
2. Usually in color
3. Projected medium, i.e., a beam of light passes through and projects the positive, transparent image onto a screen
4. Effectively used when combined with taped narration
5. Usually contains 20 - 70 frames
6. Shown one frame at a time at any pace desired

### Advantages of Filmstrips:

1. Easily produced by teacher
2. Inexpensive, whether produced or purchased
3. Adaptable to individualized instruction, i.e., students may progress at own rate.
4. Bright image requires only moderately darkened room
5. Wide range of applications
6. Demonstrates planned sequence of ideas
7. Used effectively with other material
8. Easily and compactly stored
9. Available in wide range of subjects in most school libraries
10. Easily handled by children; they cannot get the sequence out of order

### Disadvantages:

1. Fixed, invariant sequence
2. Not adaptable in form to changes in subject matter
3. Fairly easily damaged
4. Limited effectiveness when used alone
5. Often lack detail
6. Not appropriate for teaching motor skills

### Principles of Utilization:

1. Filmstrips are a useful means of illustrating concepts and of tying words to objects of things.
2. Filmstrips have been found useful in a wide variety of instructional fields ranging from spelling, nursing, mechanics and economics to social studies, sciences and health and safety education -- from elementary school through college.
3. Filmstrips appear to be about as effective as silent or sound motion pictures in teaching certain kinds of factual information.
4. Filmstrips are especially suited to the kind of teaching that requires individual pacing or active student participation, learning stations, centers, individual instruction.
5. Filmstrips used in combination with other media (films, a field trip, a demonstration) often produce learning results that are superior to those obtained from the use of one medium alone. A study by Romano, for example, showed that the use of filmstrips, films, and still pictures together and in support of each other contributed to the development of significantly improved vocabulary skills.
6. When concepts of skills involving MOTION are to be taught, still pictures such as those contained in filmstrips are likely to be less effective than motion pictures.
7. When filmstrip pictures are deficient in detail, definition, or clarity, they fail to contribute to the student's knowledge and may inhibit learning.

### Procedures for Utilization:

1. Preview the filmstrip after consulting the teacher's guide (if available) to ascertain the goal or objective of the filmstrip. During preview, decide whether or not that filmstrip could accomplish the stated objective with your class.
2. Make a list of vocabulary or terms to introduce. Prepare supplementary comments to various frames.
3. Prepare the class by providing brief overview of filmstrip content by relating it to the general lesson of unit of instruction.
4. Insert filmstrip into projector upside down.
5. During use, ask questions.
6. After use, provide appropriate practice of material presented in the filmstrip.
7. Carefully roll up filmstrip and return it to its container.

### Choosing Filmstrips:

#### Ask Yourself:

1. Does the filmstrip deal with a subject applicable to teaching requirements?
2. Is its content accurate, truthful, and up to date?
3. Does the subject lend itself to filmstrip form? Or could it be better presented in some other medium such as a pamphlet or a film?
4. Does the filmstrip treat the subject at a level (of vocabulary load, conceptual density, interest) suitable for groups with which it is to be used?
5. Is it technically well produced (with photography clear, enough close-ups, good compositions and exposures)?
6. Is it educationally well produced (with good continuity and organization, as well as a review or self-test at the end, if appropriate)?
7. Are captions appropriate (sufficiently redundant, placed at the bottoms of frames, succinct, with key terms underlined or capitalized)?

### Production Principles:

A. W. Vandermeer and his associates conducted three research projects on the effectiveness of various forms of filmstrips in teaching the same topic. Their data relate directly to teaching results and provide important criteria to consider in choosing filmstrips.

Captions make a difference in learning from a given "frame" or picture. The caption should be at the bottom of the frame, words should be used rather than numbers, and the producer should take "pains" to speak the "exact truth."

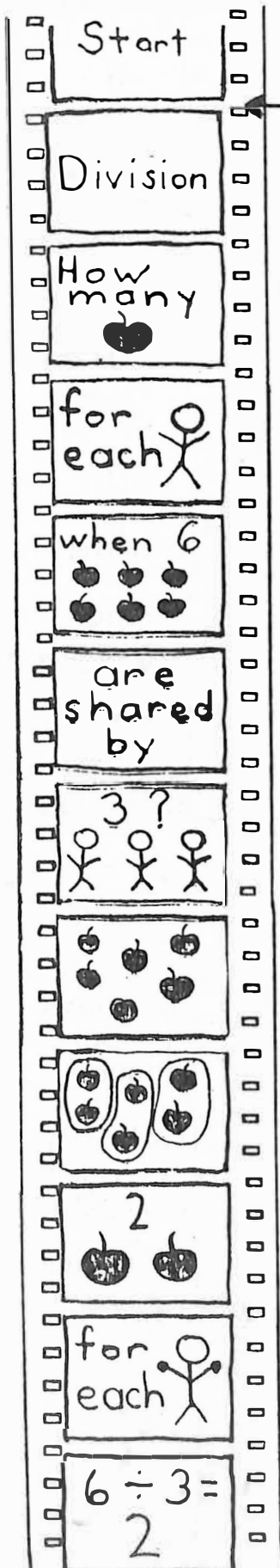
Captions can be improved (1) by redundancy or repetition where the materials are unfamiliar, (2) by using stronger words, (3) by succinctness and (4) by capitalizing or underlining key names.

Additions of labels and directional arrows improve filmstrips. In some cases, increasing the prominence of labels and arrows are shown to have improved learning from a given frame.

Pictorial or graphic elements of filmstrips seem to benefit from (1) increasing the "inconicity" of the respective frames (such as "showing how a waxing

moon would actually look from the earth, rather than from two positions") and (2) multiplying cues by adding "redundant elements of different kinds, but with same information content."

## HANDMADE FILMSTRIP PRODUCTION



- 1) All filmstrips should have a leader, the length of the strip at the beginning that is used to thread the filmstrip into the projector. This preserves the content of the filmstrip from threading damage. On the first frame or two, draw in the word "START". This indicates that it is the beginning of the filmstrip. Leave blank at least 5 or 6 frames after START and before the title frame.
- 2) Plan the filmstrip in advance. Work out a storyboard.
- 3) Place acetate over the filmstrip guide. (found on p. 209 ). Be careful to line up the edges and the holes.
- 4) It is not necessary to draw in the frame guides between the frames. If you want to though, it is recommended that you make a black line to separate the frames.
- 5) Draw or print carefully on the acetate with waterbase markers. Be careful in making changes or covering mistakes. A flaw that appears to you while drawing will be amplified many times when projected.
- 6) To make your filmstrip permanent, lightly spray the drawings with a fixative, such as Krylon "Crystal Clear".
- 7) This technique is an excellent one to try out with students. Allow them to make instructional or illustrative materials for a demonstration or "show-n-tell". Students welcome the opportunity to express themselves in creative ways.

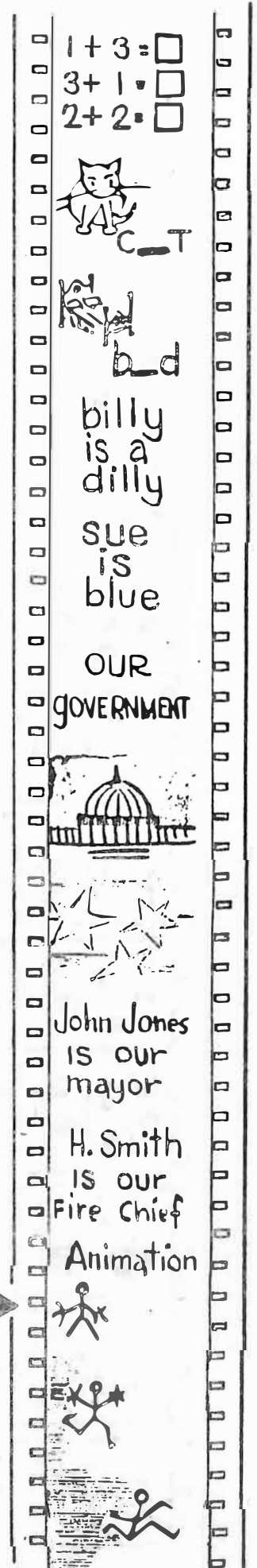
These simple filmstrips have a multitude of applications in the classroom. In addition to student productions, they can be used to present spelling lists or math problems, phonics lessons, counting skills, or virtually any skills that are enhanced by the presentation of simple visuals or verbal or number sequences. Diagrams or outlines can be effectively presented by your handmade filmstrip also.

# SOME HINTS FOR MORE EFFECTIVE FILMSTRIPS:

From teachers who are making their own —

1. When working on the individual frame always start your drawing with the lightest color and finish it with the darkest color, otherwise the dark color may tend to smudge the light color. Always work on dull side of film and follow this sequence:  
Work with lightest colors first.  
Put in darker color next.  
Draw illustrations next, with finest details following.  
Do printing, writing or typing last—using darkest inks.
2. Use COLOR extensively (remember light colors first, then dark color to avoid smudging).
3. Keep illustrations SIMPLE—they need not be "arty" or "professional-looking" to be effective. Stick figures can tell a story just as well as elaborately drawn pictures.
4. Give film "credits to all participants, especially when children have worked on them. Every child likes to see his name "in lights."
5. A filmstrip need not be long — 15-20 frames can tell a story quite effectively.
6. Cut up old, worn-out commercial filmstrips for their illustrations; splice these into your "U" FILM\* filmstrip.
7. Make sound filmstrips by tape recording your narrations; synchronization can be achieved by ringing bell or buzzer to signal advance of frame.

Example of Filmstrip Frames



\* Hudson Photographic Industries, Incorporated.



# Assignment #10

## HANDMADE FILMSTRIP

### BEHAVIORAL OBJECTIVE

Given a piece of 35mm film stock, the student will produce a 10-15 frame filmstrip by drawing directly on the clear acetate. The strip will present an orderly and logical sequence of ideas that could be used in classroom instruction.

### Materials needed:

strip of 35mm filmstock  
filmstrip template  
various waterbase markers (Lumocolor recommended) or  
various oilbase markers (Sharpie or Lumocolor recommended)

### Production steps:

1. Using the film guide, on your piece of film draw frame boundaries.
2. Create 2 extra frames on either end of your filmstrip. These frames will be labeled "START" and "END" respectively.
3. Print the title on your filmstrip on frame one.
4. Complete remaining frames, for a total of at least 10 frames.
5. Print closing title on last frame.

(Cut here and attach to assignment when submitted)

### EVALUATION

Name \_\_\_\_\_

### Scale Range

### Student

### Instructor

0 - 2 Logical sequence of frames

\_\_\_\_\_

\_\_\_\_\_

0 - 2 Sharp boundaries and even separation of frames

\_\_\_\_\_

\_\_\_\_\_

0 - 4 Cleanly drawn visuals - not blotchy or smeared

\_\_\_\_\_

\_\_\_\_\_

### TOTALS

\_\_\_\_\_

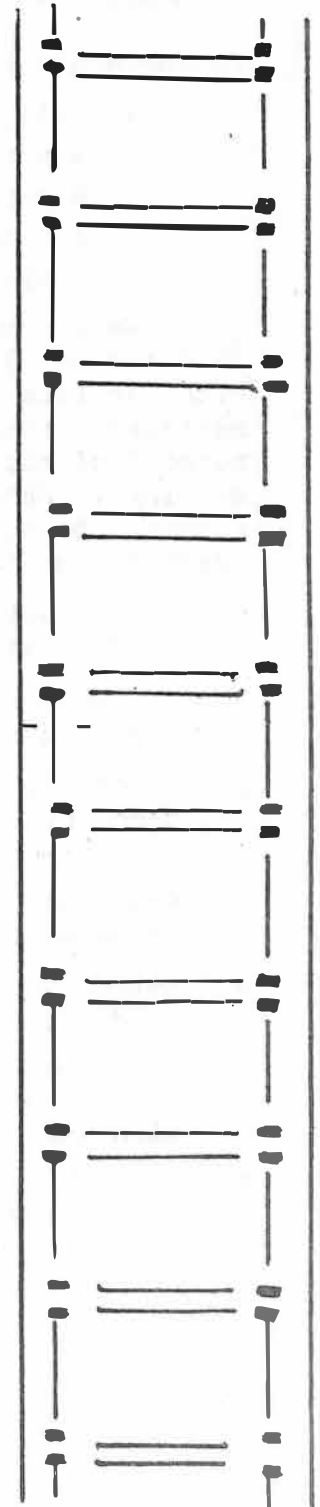
\_\_\_\_\_

### Grading Scheme:

7 - 8 = A

5 - 6 = B

3 - 4 = C



Filmstrip Production by Direct Filming  
Without a Half-Frame Camera  
(Optional)

Before beginning: Read B & L, Unit 23

If you follow the procedures outlined below with attention to detail, you should be able to create a satisfactory color filmstrip by filming sequences directly with a standard 35mm camera.

Photographic Preparations:

You will find the following photographic accessories very useful:

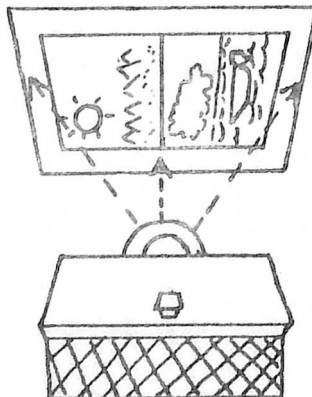
- A photographic light meter to determine exposure accuracy
- A copystand to steady the camera
- A closeup attachment for Instamatic or wide angle lens for 35mm
- Copy lights or flash cube, strip of black paper

We recommend you use Kodachrome, Ektachrome, or Highspeed Ektachrome film (36 or 20 exposures). Follow the carefully printed directions included with the film. If you have an adjustable 35mm camera, you will notice 3 settings: lens opening, shutter speed and focus. (After you understand the purpose of each of these, use the exposure meter to help you make the proper setting.) REMEMBER! a 36-exposure roll of 35mm film is equal to 72 filmstrip frames. Be sure to leave a few frames on either end for the leader and trailer. Advance your camera to exposure #4 and follow these directions:

Filming Illustrations and Photographs:

(Read steps 1-6 carefully before proceeding. )

1. All scenes must be horizontal and prepared in a 3 x 4 ratio (9" x 12" is a good size). Leave adequate margins around material.
2. Place illustrations and/or photographs in sequential order and number each one on the back. Be sure your title and credits are included in the correct order.
3. Place the first two pictures on a matte black surface so that they are oriented the same. Leave about 1" of black surface between the pictures.
4. Attach your camera to the copystand or other stable device so that it is held steady.
5. Set proper exposure and adjust camera so that both pictures are included in the shot and are in focus. (See illustration below.) Remember that each shot represents 2 filmstrip frames.
6. Repeat step 5 until filmstrip is completed. ONE MISTAKE AND YOU MUST START AGAIN!



#### Processing the Film:

When you send the film to be developed be sure to indicate that it is to remain as a strip, and not be mounted as slides. The result will be a sprocketed filmstrip.

#### Adding Sound to the Filmstrip:

See the Unit on AV (Sound Slide Presentation)



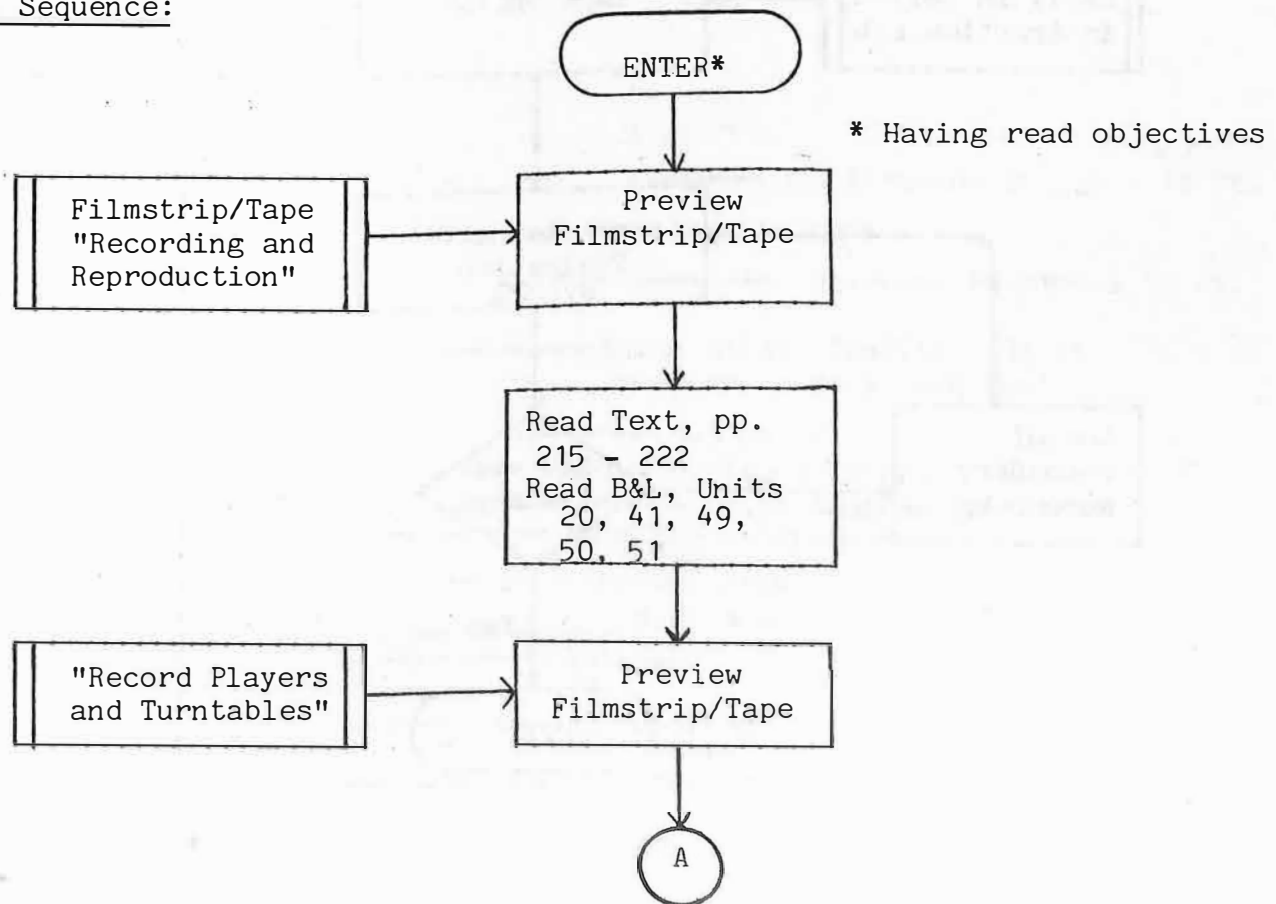
## AUDIO

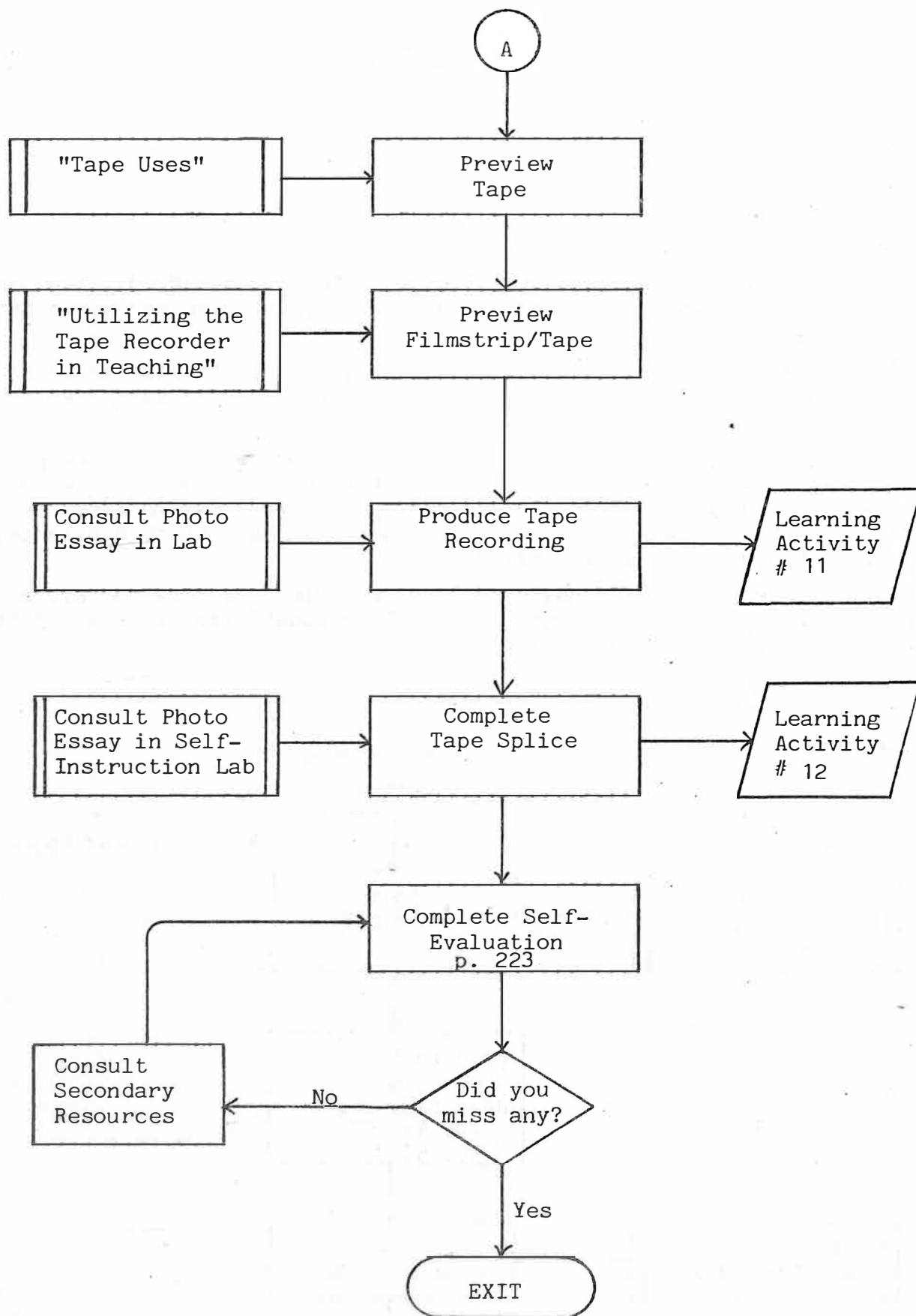
### Record Players and Tape Recorders

#### Instructional Objectives:

1. Be able to describe sound frequency and intensity.
2. Be able to list three characteristics of sound recording, distinguishing in at least two ways the differences between phono disc and audio tape recordings.
3. Given a hypothetical instructional setting, be able to list at least two potential applications of audio media for accomplishing the given objective.
4. Given a record player, a microphone, a tape recorder, and the proper connecting cables, be able to record your voice introducing at least thirty seconds of music (or information) to be transferred from the record, with equivalent recording levels and an absence of sibilance, popping and excess transfer noise.
5. Given a tape splicer and splicing tape, be able to splice two pieces of audio tape together such that it is trimmed flush with the edge of the tape and will withstand pulling.

#### Task Sequence:





### Characteristics of Sound:

Sound is a form of energy that is perceived by the ear, which distinguishes between different sounds based on their characteristics. Sound is created by the exertion of pressure on the sensitive mechanism of the inner ear. The pressure results from the compression and release of molecules in a wavelike sequence. Sound is visualized in waves (see Figure 1). The amount of up-and-down movement is known as the amplitude of the wave. The greater the compression

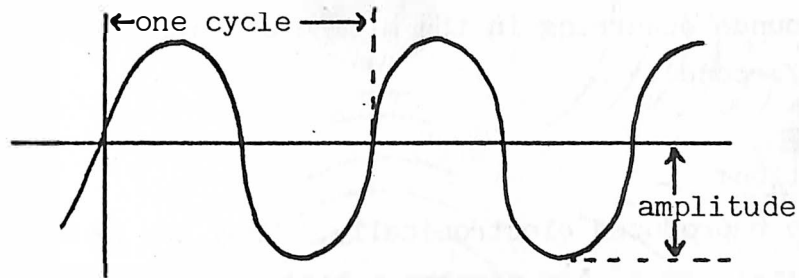


Figure 1. SOUND WAVE

of sound into waves (the higher the amplitude), the more intense will be the sound. Amplitude is a measure of sound intensity. This intensity is measured in decibels of sound dB. The human ear is capable of perceiving a wide range of sounds, from practically zero decibels all the way up to 120 dB, before the intensity causes pain and distortion. A list of sound levels of normal noises is presented in Table 1.

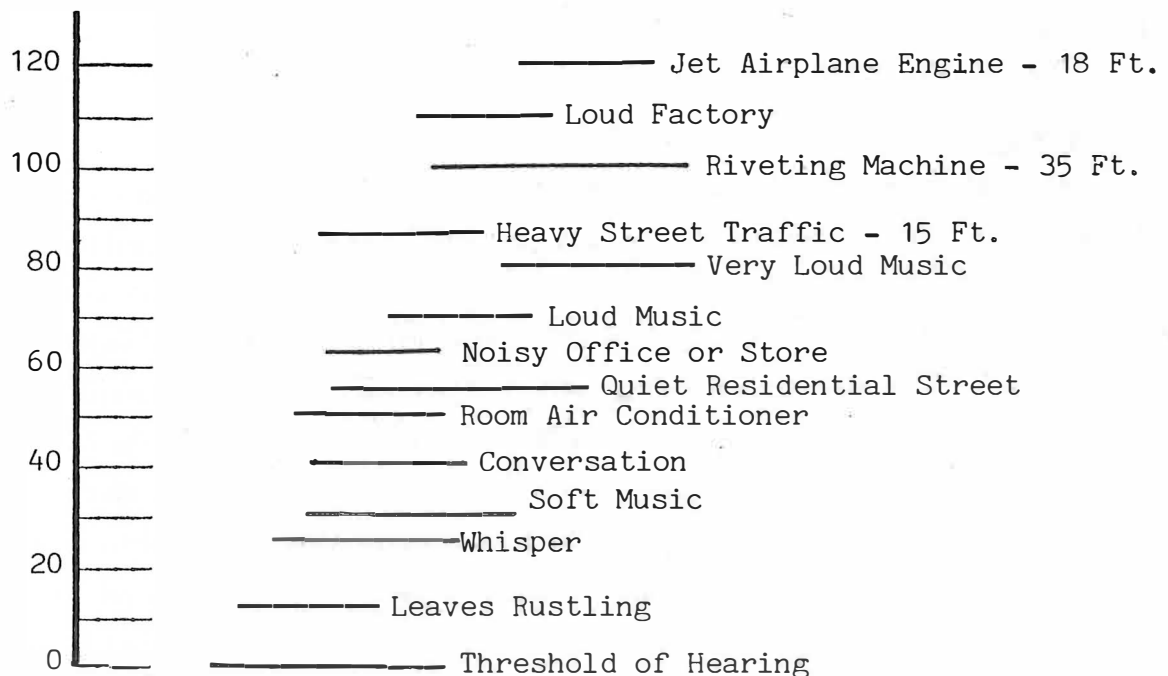


Table 1. SOUND LEVELS

The number of waves or cycles a sound produces in a given period of time determines the pitch of the sound. Sound is measured in cycles (or Hertz - 'Hz' - after the discoverer) per second. Bass sounds produce up to 1000 Hz/second while alto or treble sounds produce up to 20,000 Hz/second. The pitch described here is also known as sound frequency (i.e., frequency of sound waves). Humans are capable of hearing sounds as low as 16 - 20 cycles or Hz/second (varies according to author) and as high as 15,000 - 20,000 Hz/second. The audible hearing range of humans varies with the individual. The ear is most sensitive to sounds occurring in the middle of this range (approximately 1000 - 3000 Hz/second).

#### Sound Reproduction:

Sounds are reproduced electronically. They are usually perceived by a microphone, containing a thin diaphragm that functions like the inner ear in reacting to the pressure of sound waves. The fluctuations of the diaphragm are condensed and converted into electromagnetic waves which are then electronically recorded onto audiotape or records. The signal representing the sound is recorded by converting it to a wavy groove on the record or magnetic pattern on the tape (or an optical pattern on film). The record player and tape player converts these patterns back into electrical current, which they amplify and send through a speaker which recreates the sound by vibrating back and forth to create new sound waves (compression and rarefaction, i.e., release).

#### Microphones:

Microphones are the instruments that perceive sound and convert it into electricity for recording or amplification. They vary in method for converting sound to electricity. They vary in quality, which determines the frequency range of sounds they are capable of perceiving. They also vary in directionality, i.e., the directions from which they can perceive sound (see Figure 2). A unidirectional microphone can pick up sounds from one direction. In order for sounds from the other directions to be perceived, they must bounce off an object and into the microphone. Such a microphone has distinct advantages. A bi-directional microphone picks up sounds from two directions (these are rare now) and a non-directional (sometimes called omni-directional) perceives sounds



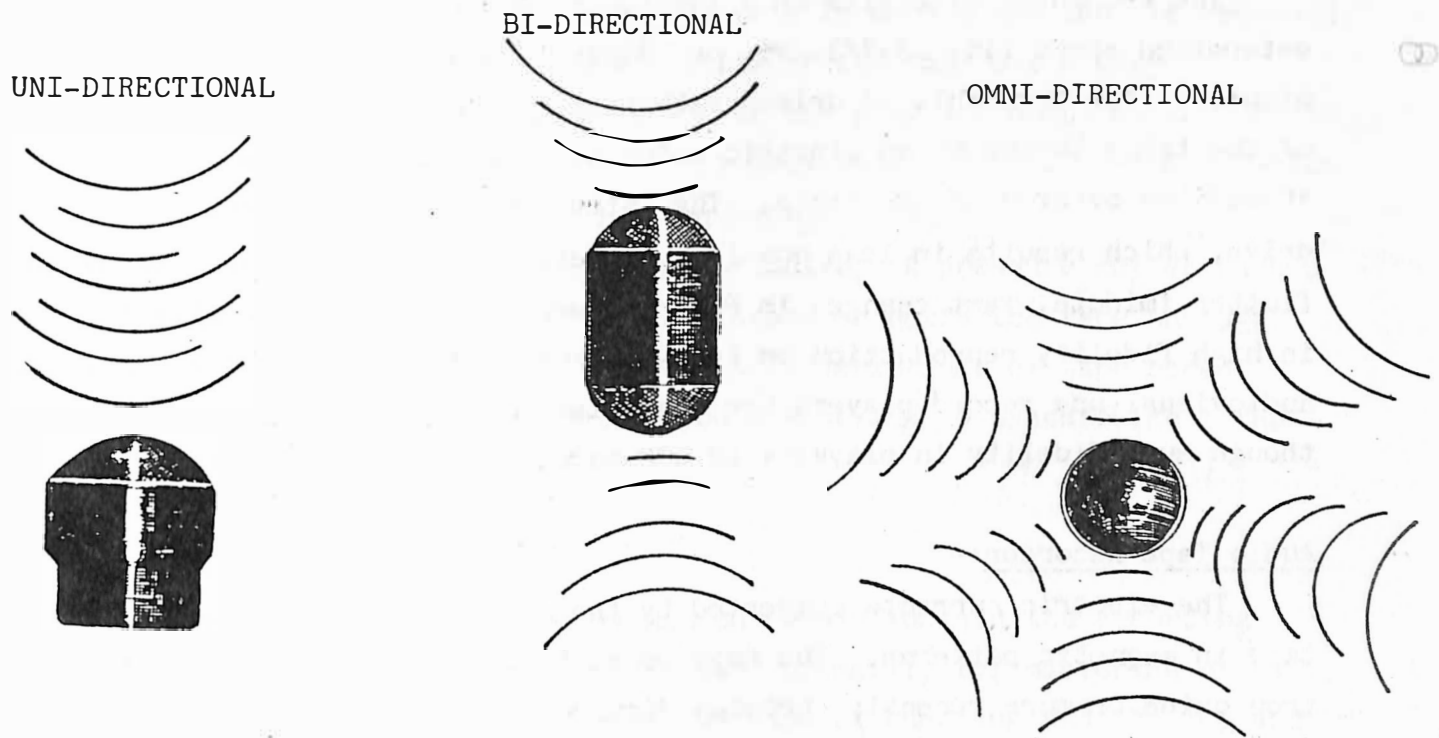


Figure 2. TYPES OF MICROPHONES

from all directions. Newer, portable tape recorders contain built-in condenser microphones which are both non-directional and extremely sensitive to ambient noise. Sometimes the background noise becomes as loud as the primary source. This is because of the automatic level control which constantly increases whatever sound is available for the maximum recording level.

#### Record Players:

The stylus or needle in the tone arm of a record player tracks through a pressed groove in the record (see Figure 3). These grooves are wavy and irregular. The wavy motion of the stylus is converted into electricity which is amplified and played through speakers.

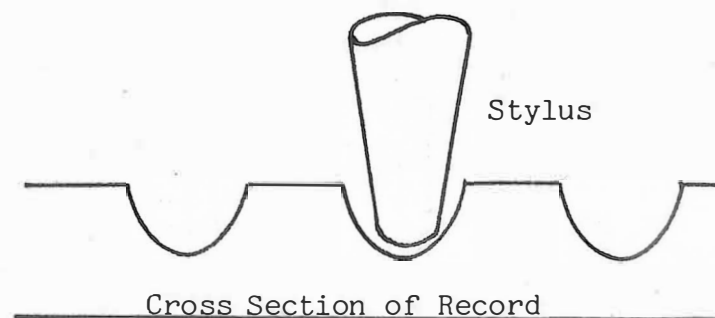


Figure 3. STYLUS AND RECORD GROOVE

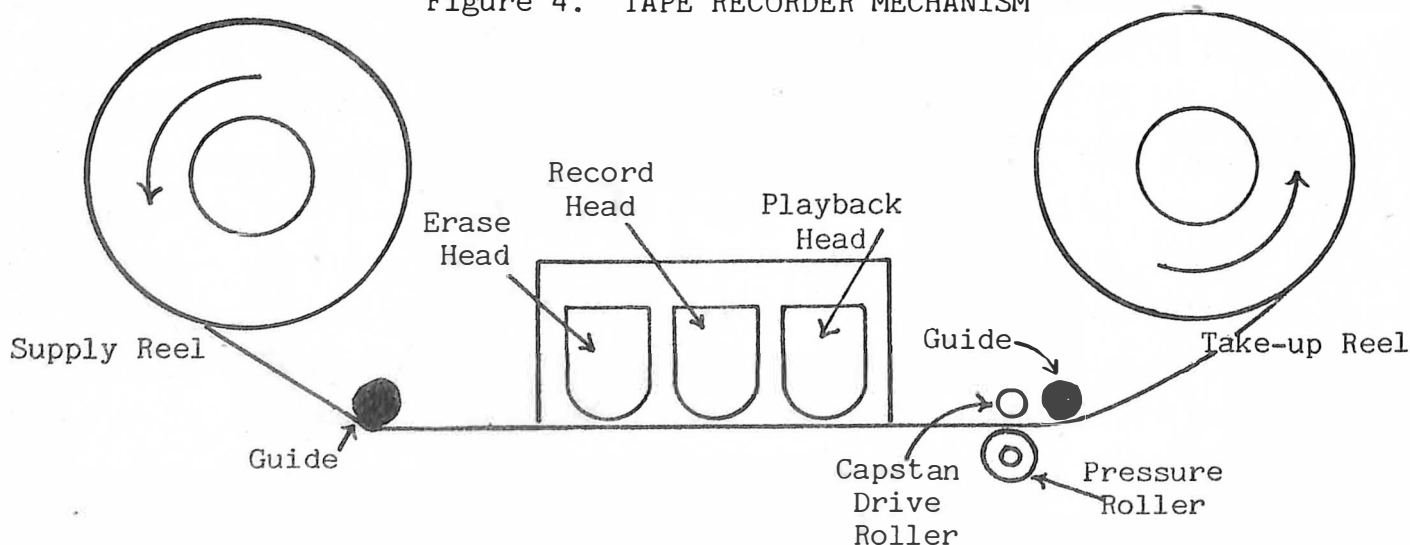
The record or disc sits on a turntable, which revolves it at a pre-determined speed (16, 33-1/3, 45, or 78 revolutions of the turntable per minute). The turntable is driven either by a rubber wheel along the inside of the table turned by an electric motor or by a rubber belt stretched around the outside of the table. The latter provides a smoother, more direct drive, which results in less wow (minute, slow changes in record speed) and flutter (minute, fast changes in record speed). This is especially important in high fidelity reproduction on long-playing 33-1/3 RPM record albums. Most audiovisual-use record players use a simpler, more rugged drive system, though such fidelity in playback is not normally an important criterion.

#### Audio Tape Recorder:

The electric currents converted by the microphone are recorded on audio tape in magnetic patterns. The tape consists of a mylar plastic with an iron oxide or more recently chromium dioxide coating. The molecules of these coatings can easily be magnetically rearranged into different patterns, which result in different sounds being reproduced.

As the tape passes over through the mechanism at a predetermined speed (1-7/8, 3-3/4, 7-1/2, or 15 inches per second; most audiovisual units have 3-3/4 or 7-1/2) any old signals are erased (randomly rearranged) by the erase head and new patterns are recorded by the record head (see Figure 4) from electronic signals from the microphone and amplifier. The faster the tape is

Figure 4. TAPE RECORDER MECHANISM



pulled through the mechanism, the more discrete is each sound that is recorded, and therefore the frequency range and quality of the tape are higher.

During playback, the tape is pulled over the playback head, which "reads" the electromagnetic pattern and converts it back into electric currents, which are amplified into speakers, which in turn recreate sound.

The tape is "driven" by a capstan motor drive. A pressure roller pushes the tape against this drive roller which cinches or pulls the tape through. Inexpensive capstin drive units often result in variations of tape speed. These are not usually bothersome unless you are trying to synchronize a tape recording with another source.

#### Cassette Tapes:

The cassette tape (see Figure 5) has so revolutionized the recording business that reel-to-reel recorders are used primarily for mastering or by connesieurs of taped music. Because of the ease of handling and loading and because the tape is completely enclosed and cannot be twisted or unwound by students, they are perfect for school use.

Cassettes come in various lengths, or recording times (20, 30, 45, 60, 90 and 120 minutes). These times are a composite of both sides of the tape. That is, a cassette tape designated C - 90 (for ninety minutes of recording) requires recording forty-five minutes on one side, flipping the tape over, and recording forty-five minutes on the other, ergo, sides A and B.

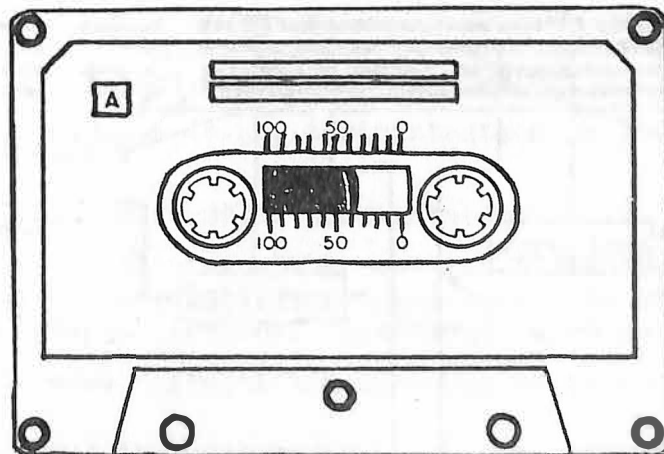
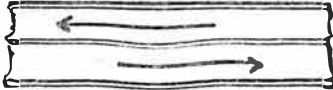

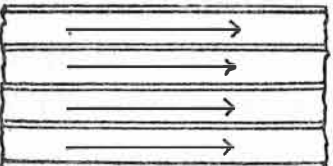


Figure 5. AUDIO CASSETTE

### Recording:

Recording of music is normally done on one, two, or four channels. A monaural tape is recorded in two tracks: one track one way, flip the tape over and another track the other way.

<u>Channels</u>	<u>Designation</u>		
One	Monaural		TRACK 1 TRACK 2
Two	Stereophonic		LEFT CHANNEL RIGHT CHANNEL RIGHT CHANNEL LEFT CHANNEL
Four	Quadraphonic		CHANNEL 1 CHANNEL 2 CHANNEL 3 CHANNEL 4

Stereophonic recordings result from two separate microphones producing two separate signals that are recorded on the same tape or record. They are picked up by two separate playback heads or sides of the stylus and amplified by two separate amplifiers into two separate speakers (see Figure 6).

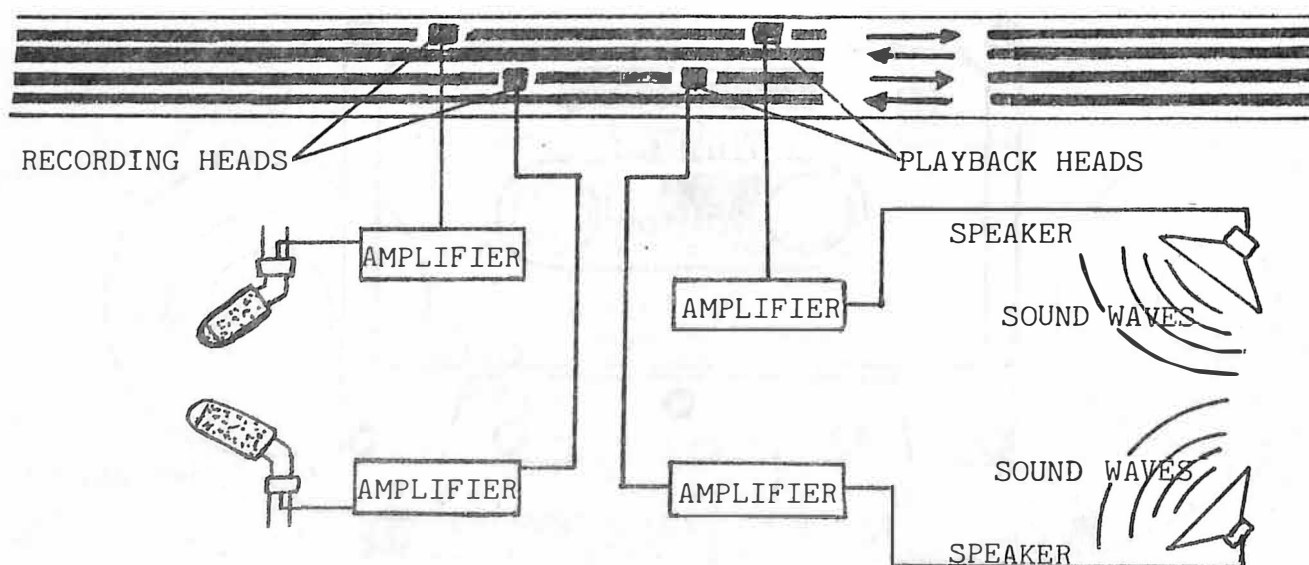


Figure 6. STEREOPHONIC RECORDING

Quadraphonic tapes and records multiply stereo by two, i.e., four sources, four microphones, four tracks on the same tape, four amplifiers and four speakers, all discrete. The only difference is that a quadraphonic tape can't be flipped over on the recorder. The four tracks of the tape all run the same direction to produce four separate channels or sources of sound.

### Instructional Applications:

#### I. Expository uses of audio

1. Lecture/direct information presentation
2. Reading interpretation, reading aloud with feeling, story-telling
3. Plays and drama
  - a. spoken text only
  - b. spoken text & sound effects
4. Interview done by an interviewer (a person with questions) and an interviewee (a person with answers); resource people unavailable for appearances.
5. Discussion-- The interaction between two or more people who have something to say
6. Music
7. Music and an explanation
8. Audio discrimination, sounds and an explanation
9. Review of information

#### II. Interactive uses of audio

1. Drill-- the repeating of ideas with responses anticipated (usually covert or silent responses)
2. Directions for action-- verbal direction paced to allow the learner to actually do something (overt response) (e.g., directions for learning station; audiotutorial instruction)
3. Testing students (e.g., administration of individualized spelling lists)
4. Stimulus for discussion (presentation of issues and ideas)
5. "Creative" listening, "therapeutic" listening using sound as stimulus for physical response (dance), verbal response (poetry or prose), graphic response (painting), also covert responses.
6. Feedback mode: practicing speeches or presentations

#### III. Mixed media that includes audio

1. Expository use of audio that includes visual materials, such as slides (see Slide-Tape unit).
2. Interactive use of audio that includes visual materials

IV. Speech compression/speeded discourse

V. The four language arts: reading, writing, speaking and listening.  
The neglected art of listening.

### SELF-EVALUATION

1. Cassette tape recorders operate at which speed?
  - a. 3-3/4 ips.
  - b. 1-7/8 ips.
  - c. 7-1/2 ips.
2. In transferring music from a record to a tape, which connection sequence would you use?
  - a. headphone to microphone
  - b. line out to microphone in
  - c. audio out to line in
3. Normal audio frequency range of the human ear is:
  - a. 16 - 16,000 Hz
  - b. 60 - 6,000 Hz
  - c. 5 - 120 dB
  - d. 50 - 500 dB
4. The correct angular relationship of the record player needle to the groove is:
  - a. 45 degrees
  - b. 60 degrees
  - c. 90 degrees
  - d. 180 degrees
5. The normal speed of long playing records is:
  - a. 16 rpm
  - b. 33 rpm
  - c. 45 rpm
  - d. 78 rpm
6. Which type of microphone picks up sound from all directions?
  - a. non-directional
  - b. bi-directional
  - c. uni-directional
7. Recording tape is coated with a magnetizable surface of:
  - a. iron oxide
  - b. ferric sulfate
  - c. aluminum bisulfate

ANSWERS:  
1. b  
2. c  
3. a  
4. c  
5. b  
6. a  
7. a

## AUDIO TAPE

### Assignment # 11

#### BEHAVIORAL OBJECTIVE:

The student will create an audio-tape message on cassette by direct recording and dubbing from another audio source (record player).

#### Materials needed:

record player  
cassette tape records  
cassette tape  
record  
patch cord  
microphone

#### Production steps:

1. Using the microphone, the student will record his name, course number and section, and an introduction to the succeeding pre-recorded message.
2. Using the proper patch cord connect the output of the record player to the live input of the tape recorder.
3. Set levels.
4. Dub at least 15 seconds of music or other message from the record.
5. Experiment.

(Cut here and attach to assignment when submitted)

#### EVALUATION

Name \_\_\_\_\_

#### Scale Range

#### Student

#### Instructor

- |       |   |       |       |
|-------|---|-------|-------|
| 0 - 5 | Clearness of voice recording                    | _____ | _____ |
| 0 - 5 | Lack of sibilance, popping, etc.                | _____ | _____ |
| 0 - 5 | Closeness of recording level for direct and dub | _____ | _____ |
| 0 - 5 | Clearness of dubbed recording                   | _____ | _____ |
| 0 - 5 | Proper recording level                          | _____ | _____ |

TOTALS

\_\_\_\_\_

\_\_\_\_\_

#### Grading Scheme:

23 - 25 = A  
22 - 21 = B  
19 - 20 = C



## AUDIO TAPE SPLICE

### Assignment # 12

#### BEHAVIORAL OBJECTIVE:

Given a guillotine splicing block, two pieces of audio tape and splicing tape the student will permanently splice together the pieces of tape so that they will not separate upon bending or pulling. The splice should be trimmed with no ragged edges even with the edge of the tape.

#### Production steps:

1. Place one piece of tape in right side of splicer.
2. Place other piece of tape in left side of splicer.
3. Cut both pieces of tape on diagonal with cutter.
4. Apply splicing tape and smooth out.
5. Trim edges of tape.
6. Remove excess tape.
7. Test splice.

(Cut here and attach to assignment when submitted)

#### EVALUATION

		Name _____	
<u>Scale</u>	<u>Range</u>	<u>Student</u>	<u>Instructor</u>
0 - 5	Permanence of splice	_____	_____
0 - 5	Absence of excess tape; neatly trimmed edges	_____	_____
TOTALS		_____	_____

#### Grading Scheme:

- 9 - 10 = A  
7 - 8 = B  
6 - 7 = C

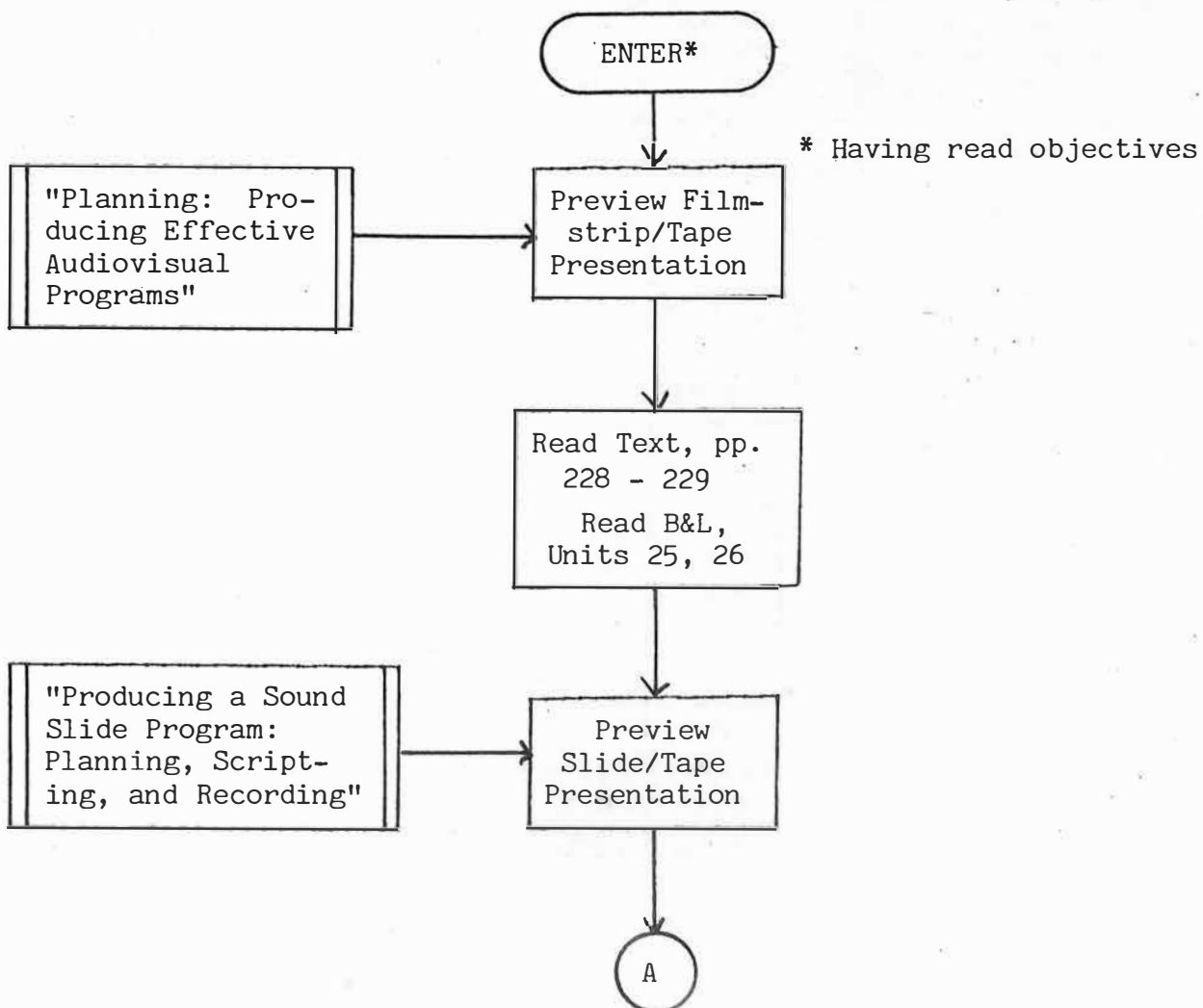


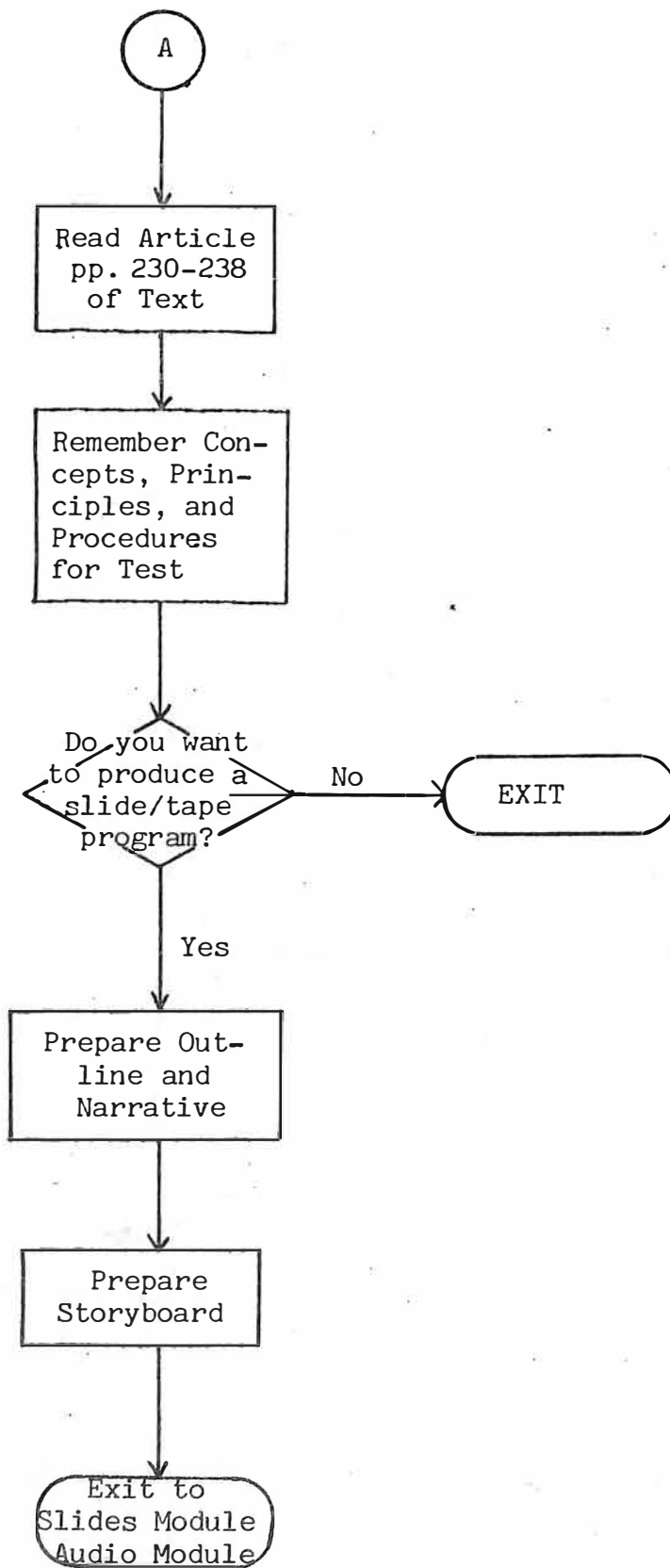
## PLANNING AND PREPARING AV (SOUND SLIDE OR SOUND FILMSTRIP) PRESENTATIONS

### Objectives:

1. Given a topic appropriately treated by a slide-tape presentation, be able to write a narration and outline scripts (treatment) of the information.
2. Given the outline script, be able to convert it into a storyboard.
3. Using the storyboard, be able to:
  - a) prepare good quality, well-designed slides to convey the ideas presented in the storyboard (See unit on Slides).
  - b) prepare taped narration according to the script, using musical accompaniment or sound effects where capable and appropriate (See unit on Audio).

### Task Sequence:





## PLANNING THE SLIDE/TAPE PROGRAM

Because of the ease of production, flexibility, and low cost, the slide/tape presentation has become one of the most popular and effective media combinations used for instruction. As an effective teaching tool, the slide/tape (substituting for filmstrip/tape or sound slide) program can be imaginatively designed and produced to fulfill a very broad range of instructional objectives in almost any subject area. From motivating learners (changing affective behavior) to teaching abstract concepts (higher level cognitive learning), the slide/tape presentation can provide an inexpensive substitute for expensive-to-produce or expensive-to-rent instructional films, except where motion is an integral part of the presentation (multi-image equipment is now available that can even effectively simulate motion). Slide-tapes can be locally produced for as little as \$7.00 for a 20 slide presentation (approximately \$2.50 for film, \$3.50 for processing, and \$1.00 for a cassette tape). Longer and more complex productions will cost more. The investment is small, assuming your school or institution has a slide projector and a cassette player. If not, add \$150 to \$200 to the cost. These are common media, though, so availability shouldn't provide too much of a problem.

The techniques for producing slide/tape presentations have been simplified by the availability of tools such as the Ektagraphic Kit. (See module on slides). The equipment for producing and showing such presentations is portable, simple to operate, and applicable to a wide variety of settings or needs. These materials are flexible because they can be easily stored and cataloged, and they can be readily revised when needed. The simplicity and flexibility of the slide/tape presentation has made it one of the most widely used media in contemporary practice.

### Characteristics of Slide/Tape Programs:

1. May be pre-synchronized to advance automatically
2. May be viewed individually or in groups
3. Two-channels (auditory and visual) increase number of cues (amount of information) presented

### Advantages:

1. Inexpensive
2. Easily produced locally
3. Effective medium for: teaching concepts, changing attitudes, teaching processes
4. May be designed to meet needs of specific audience or broad range
5. Easily stored in trays and cassettes
6. Multi-modal: communicates simultaneously to auditory and visual information channels, which increases learning.

### Disadvantages:

1. Requires more equipment to purchase, transport, or set up
2. Requires more planning and lead time
3. Not as easily revised

### Instructional Applications:

1. Motivate learner
2. Change attitudes (affective behavior)
3. Teach concepts (concrete and abstract)
4. Presenting sequential processes
5. Presenting primary content material

### Principles for Utilization:

1. Set up all equipment needed to present the slide/tape program ahead of time.
2. Rehearse slide presentation (slide changes) at least twice before presenting it for the first time. If automatically synchronized, run the program at least twice to insure proper recording of inaudible change tones.
3. Start with a blank screen (produced by an opaque 2" x 2" piece of poster board or a slide (blank in the first position) rather than turning on the projector with no slide in. It improves the appearance. Just change to the first slide (opaque), turn on the lamp, and you're set to change to your first slide.

*"Preparing A Slide-Tape Program: A Step-by-Step Approach" by Mack Ryan provides some good, basic guidelines for the novice in media production. This article is presented in two parts; Part II will appear in the November 1975 issue of Audiovisual Instruction.*

# Preparing A Slide-Tape Program:

## A Step-by-Step Approach

### Part I

by Mack Ryan

A slide-tape production can serve as an initial step in opening the doors of creativity for teachers and students. Both can find great satisfaction in creating a product that they feel is useful, that requires the application of skills, and that can be enjoyed by others. An effective teaching tool, a slide-tape program can be designed based on specific objectives in nearly any subject area.

The budget for producing a slide-sound program is modest. The raw material costs for a 10 to 15 minute production total about \$15.00. This includes the price of the audiotape and the processed film. The price of the audio and the photographic equipment will vary according to the level of sophistication and convenience desired by the purchaser, with a range of \$200 for a basic audio-photographic unit to \$1,000 and up for more advanced equipment. Add \$200 to \$300 to these costs for a projector and a screen. This is not an exorbitant investment for tools that permit the development and implementation of instructional programs tailored to local needs.

Slide-tape packages provide a very convenient and flexible instructional program. Slides are easily stored in trays, carousels, cartridges, or files and can be organized, arranged, or rearranged to suit the needs of the user. Simply replace an old slide with a new one if there is a need to update the presentation. Audiotapes and cassettes also lend themselves to modification and updating by means of the erasure and rerecord features on the audio machines. The combined visual-sound production can be packaged, easily indexed, and stored in locally or commercially manufactured lockers for easy accessibility.

Because of the operational simplicity and portability of the equipment involved, slide-tape programs lend themselves to a variety of instructional settings. This type of media can be utilized effectively in a number of ways, including individualized study or repeated presentations with large and small groups of students. Programmed and self-paced packages for independent study or sophisticated high fidelity multi-image projected programs are within the range of this medium.

Once you've decided that a slide-tape program will best convey your instructional objective, how do you go about producing one? Begin the process by examining the purpose of the program. What are you trying to achieve with the presentation? Will it relate to the current instructional program? Is its aim to instruct, to motivate, or to do both? What infor-

mation and attitudes will the audience bring with them? Do you want to provide students with additional information? Do you want to change their attitudes? Contact your working colleagues who are interested in the project and solicit their suggestions for the slide-tape project. Once this phase is completed, simply list the ideas you plan to include in the program and research them to insure that no major ideas or facts have been overlooked.

A complete "outline" is now in order. Include in it the content as well as any other ideas or visual images that have come to you as you explored the purpose of the program and examined the research material related to it.

Now obtain a pack of blank 4" x 6" index cards. Start writing down or drawing crude sketches (whether you write, draw, or do both at this stage depends on your verbal or visual orientation) of ideas or facts about the program as you think about them. (This is where the outline will serve as a valuable reference tool.) The interaction between your thoughts about the program and expressing them in writing or in a visual form will generate a script. If you think of a point as you concentrate on an idea, try to state it in as few words as possible or prepare a rough sketch of it. Put each idea or fact on a separate index card, with the sketch in the upper left hand corner and the statement underneath it (See Figure 1). Go back later and complete the card if either the statement or the sketch has not been added.

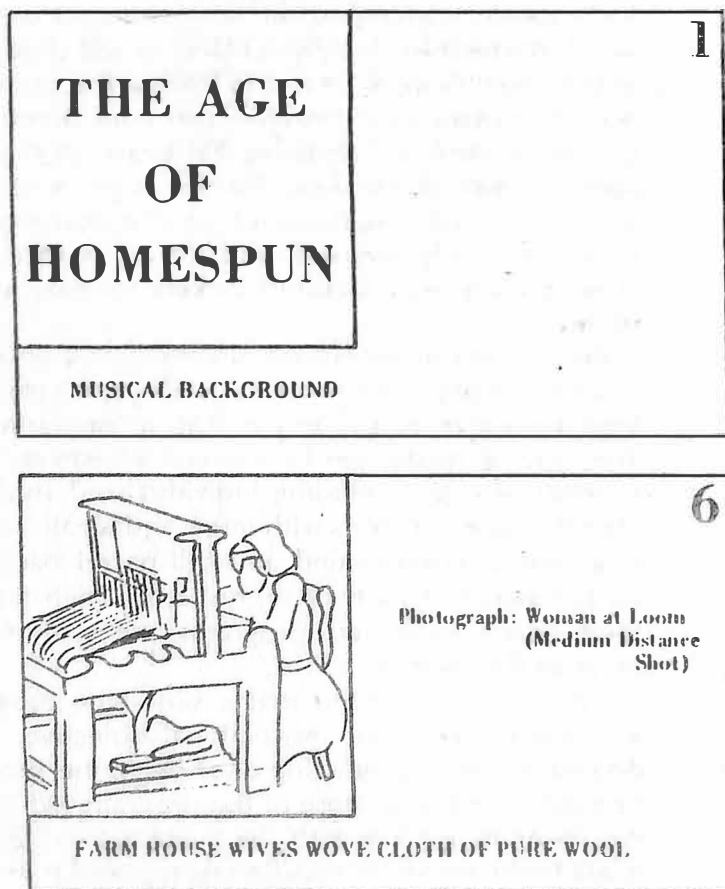


Figure 1

Lay out the 50 to 100 cards you have prepared on a large table and arrange them in an order that makes sense. For a better view of your work, tack the cards in sequence to a large wall board (See Figure 2) if it's available. It helps you visualize what

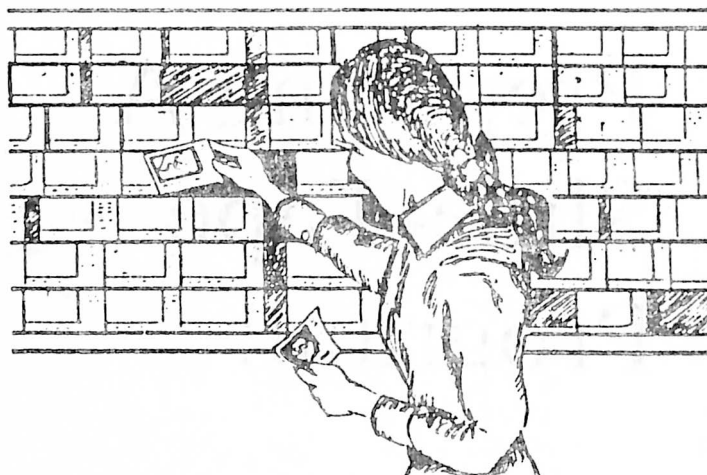


Figure 2

your final product will look like and is an excellent way to find likely trouble spots before final production. Associates can also be invited to look at it and make suggestions about its probable effectiveness. Take the time to make your critical decisions at this point. By following this procedure, you will have to make fewer major changes during the hectic, frantic period of writing, photographing, and recording.

Ask yourself some hard questions as you examine the planning board. Are the visuals related to the text? Are they easily "read"? Are they too cluttered with information? Is the language simple and direct? Is the scheme of arrangement logical?

With the planning stage completed, you are ready to proceed to the next step. A high-quality slide-sound presentation requires a good script. This can be achieved if a number of principles are adhered to in its preparation. These revolve around the script's organization, narration, visuals, and sound. Let's move to the first element of the program, its organization.

Go back to the index cards tacked up on the planning board. Again examine them closely and arrange them to insure that the program will develop in a logical, organized sequence. It should have a beginning, a middle, and an end. The beginning should give only essential information and point the audience in the direction you have set for them. Too much information in the beginning can confuse your viewers. The middle should build on the information given in the beginning. Some of the cards will have to be discarded, others modified, and new ones added to the board. During this organizational process it will help to keep the following guidelines in mind:

1. Avoid the inclusion of too many concepts. It is much better to develop one concept clearly than to include several incomplete generalizations.



2. Avoid a lengthy introduction. Catch the students' attention quickly by the visualization of a problem or other stimulus device.
3. Set the stage at the beginning of the presentation to let students know what it's all about.
4. Organize with the progressive disclosure or "reveal" technique in mind. Begin with the known and progress to the unknown.
5. Weave the theme throughout the program.
6. Reinforce or summarize thoughtfully.
7. Whenever possible, employ comparisons with the present to make the information more meaningful.
8. Encourage student participation and involvement by asking questions that relate to the students' own experiences and observations.
9. Include human sidelights whenever possible indicating the role the individual plays.
10. Try to bring out the value systems of the people: what they are and what the social structure does to support these values.
11. Apply the human element to inanimate objects, (e.g., buildings, tools, etc.), by explaining what goes on there and how it's used.
12. Use pointed examples for simplification and clarification. "Make the invisible visible" by using analogies and illustrations that can make an abstract idea concrete.
13. Use art frames for review and ask questions that will stimulate discussion whenever possible.
14. Be careful of using symbolism, particularly with slower students.
15. The optimum duration of a slide-sound presentation will depend on the amount of narration. The maximum length for the elementary grades should be 10 minutes, and 10-15 minutes for the secondary grades. Usually 50 slides will be a sufficient number for the program.

After organizing the program, focus on your visuals. They should carry the weight of the show. The narrative should flow from the slides. Otherwise, you will have just a narrative with slides added. Test their practicality. Are some of the scenes too far away to photograph? Is there a picture at hand you can copy? How complex will the art work be? Is the material you want to copy copyrighted and therefore a release required from the publisher? Are any of the scenes you plan to shoot too controversial? Include information on the card about shooting location, camera angle, lighting, and art work. This will save time when you get to the production phase of the project. Your presentation will also be more satisfactory if you refer to the suggestions listed below when working with your visuals:

1. Be careful of giving too much detail in the visual.
2. Select visuals that display action.
3. Use charts and graphs sparingly because they

are difficult to follow and because there is not much time for study and comprehension.

4. Avoid using a map for the first slide after the title slide.
5. Avoid multiple panel and montage visuals (several pictures on one slide) as much as possible except for comparison or for showing progression.
6. Whenever possible, include people of more than one race or sex in the visuals.
7. Don't use "pick-ups" or repeat art visuals. Get variation through long views, close-ups, and angle shots.

Once you feel the organization and visuals are set, start writing the narration. Don't be discouraged if it takes two or three drafts before you come up with a polished narrative. Just remember that you will get better at it as you prepare additional programs. To help you improve your writing, observe these rules as you set about the task:

1. Keep the narrative as conversational in style as possible. ("Read" into a microphone without the script and then playback and edit the narrative.)
2. Use short, clear sentences, with only one idea per sentence.
3. Use a vocabulary appropriate for the grade level. Explain any terms that may not be familiar to students at this grade level.
4. Use only one idea per slide. Make certain that the text "codes" or applies only to what is shown in the visual. Always start a frame with something directly related to the picture on the screen.
5. As far as possible, keep sentences in the present tense, except in historical matter or where the past tense is grammatically required.
6. Do not break sentences from one visual to another unless you can maintain continuity.
7. Vary the length of the narration from frame to frame to avoid monotony.
8. Occasionally insert a question to encourage the class to do some thinking.
9. Avoid more than one question in a frame.
10. Avoid beginning frames with "For example" or "For instance".
11. Avoid use of the all-inclusive terms: "all", "none", "every", and "always".
12. Avoid controversial statements.
13. Avoid negative statements; accentuate the positive.
14. Avoid phrasing that is colloquial, poetic, or subject to more than one interpretation.
15. The text should follow the eye path of the visual and/or labels—left to right, top to bottom.
16. Write concisely. Avoid using more than 50 words in one frame.

*cont'd on page 43*

# Preparing A Slide-Tape Program:

## A Step-by-Step Approach

### Part II

by Mack Ryan

*Preparing A Slide-Tape Program: A Step-by-Step Approach, Part II, continues Mr. Ryan's article from the September issue of AVI. In Part II of his comprehensive article on preparing a slide-tape program, Mr. Ryan covers photography and recording techniques for the production phase of a slide-tape program. Readers who want more information about photography may be interested in looking back to the April 1975 issue of Learning Resources. Two articles by Anita Gordon entitled "Clicking With Kids" and "Capturing and Creating with the Simple Camera" provided some basics for the amateur getting started in photography.—Ed.*

**A**re you surprised when you see an eight year-old snapping pictures with an instant, automatic camera? Probably not. Technology has enabled people of all ages to produce photographs of acceptable quality with cameras that are both inexpensive and automated. With confidence that you, too, can operate a camera, you are ready to produce the visuals for a slide-tape program.

When selecting a camera for this task, consult someone with considerable knowledge and experience in photography. The audiovisual director, a peer who is an amateur photographer, or a sales representative in a reliable camera store are usually good sources. Explain why you are purchasing the camera and how you plan to use it. The type of camera you choose will depend on your (or the school's) budget and the kinds of slides you want to produce. If copywork is involved in your project, a Kodak Ektagraphic Visualmaker or the more sophisticated 35mm single lens reflex cameras are likely suggestions. Perhaps your institution already has a camera that will do the job. Master its operation with the assistance of someone who has used it. Make sure the camera will produce quality slides. This can be determined by shooting a test roll of color film. The shooting exercise will also give you confidence in handling the camera. Your first set of color slides can do wonders for your morale and encourage you to continue toward your goal.

What type of film should you select? Color should be used. Not only is it pleasing to the eye, but it also represents reality. An apple, a burning flame, or a sample of blood doesn't have much impact when seen in a black and white photograph. If most of your scenes are to be photographed indoors under artificial light, determine whether the lights are tungsten or fluorescent and match your film to the lighting conditions. If lighting conditions are poor, you can use flash bulbs or electronic flash equipment. Outdoor shooting in the daylight hours, barring a storm, is less trying than indoor work. Most of the medium speed films will produce very satisfactory exposures. When a lighting problem arises, consult the local camera dealer or an associate who is an experienced photographer.

You are now ready to start shooting. The camera is loaded and you have several rolls of film stashed in your pockets. Wait! Don't forget to check your planning cards. They are your guides to shooting and should be at your fingertips. Study them and determine the locations for photographing the different scenes. Group the cards according to the proximity of one scene to another, and then schedule your picturetaking accordingly. This step makes it unnecessary to return to the same location more than once.

Space doesn't permit a complete discussion here of the shooting techniques of still photography. Eastman Kodak publishes a number of excellent books for this purpose; especially recommended is Kodak's *Here's How* series. The suggestions listed below provide some tips for improving your photographs:

1. Avoid visual monotony by varying the shooting distances. Try close-up, medium-range, and long shots.
2. Use different camera angles, including low-angle, high-angle and eye-level shots. By adjusting the camera angle, different moods and illusions can be created that will add interest to the show.
3. Select shutter speeds that will enhance the "action" quality of the photograph. Panning a moving vehicle with your camera at a slow shutter speed will provide a clear picture of the ve-

hicle but blur the background. This technique can give the audience the feeling of motion as they view the photograph.

4. Take at least three exposures of the scene, particularly if the lighting is contrasting. The light meter, whether it's in the camera or the hand-held type, can be fooled. Make the first exposure based on the lightmeter's reading. The second exposure should be made one stop over, and the third, one stop under the exposure indicated by your light meter.
5. Avoid camera movement. Brace yourself against a wall or place the camera on a stationary object, particularly if a slow shutter speed (1/60th of a second or less) is used. Use a tripod if it's available, when you are shooting at a slow shutter speed.
6. Compose the picture carefully in the viewfinder before releasing the shutter. Be sure all the elements you want included in the slide are seen in the viewfinder and are in focus.
7. "Squeeze" the shutter release button with a slow, steady movement.

Limit the number of titles you prepare for the slide-sound program. This is a visual-sound medium—not a print medium. In addition to titles at the beginning (introduction) and end (summary), you might want to include a few that bridge gaps or pose questions. Particularly effective are ready-made titles that can be found in your community. These include street/road signs, theater and store marquees, and community, civic or business signs ("Senior Citizens Meeting Today," "County Historical Exhibit," "Office of the Mayor," and "Think"). Some of your art students can help in the artwork and lettering that goes into titling. Other students can search books, magazines, and newspapers for illustrations that can be included in title slides. Two excellent articles in the May 1974 issue of *Learning Resources*, "Titling for Slide Presentations" and "Making Title Slides," provide additional information about preparing slide titles.

Let's assume that your script calls for a number of visuals that require copystand work—illustrations

from newspapers, magazines, books, and titles for the slides. A copystand can be purchased rather inexpensively from a photography store. You can also construct one for about ten dollars. The device shown in Figure 1 consists of a plywood base three inches by 36 inches, with a vertical track approximately 24 inches high attached at one end of the base. The camera can be fixed to a moveable block on this track that can be lowered or raised to the proper elevation, depending on the size of the object to be photographed. Scraps of black felt or black paper will serve very nicely as a mask for the picture to be photographed. Two photoflood lights can be placed about 30 inches from the center of the copyboard and at an angle of 45 degrees to the lens axis for even illumination of the object to be photographed. Auxiliary magnifying lenses for close-up work will cost approximately \$4.50 each and the lens adapter itself costs about \$4.50.

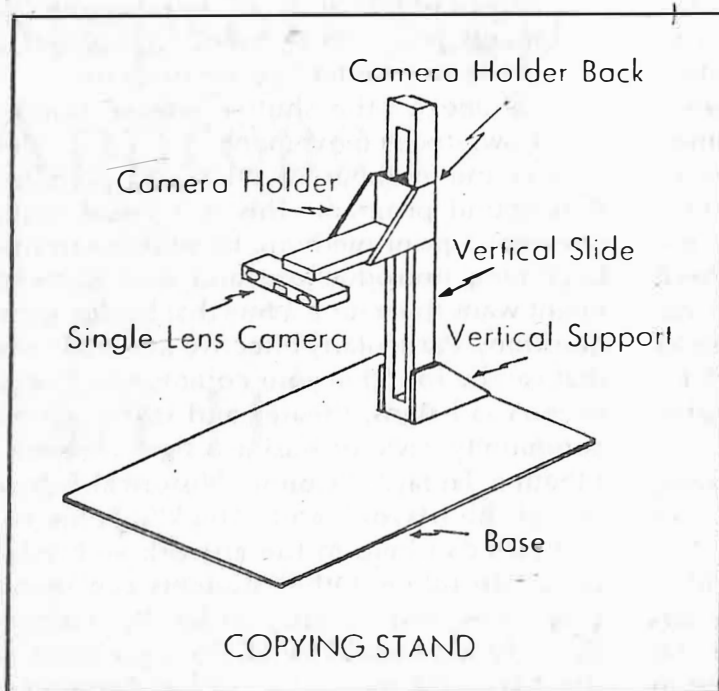


Figure 1

The number of magnifying lenses needed depends upon the size of the pictures to be photographed and the size of the subject will determine the type of lens to be used. Using a +1, +2, or +3 portrait lens in front of a standard 50mm lens, you can copy subjects from 18 inches by 26 inches down to four inches by six inches. With careful preparation, the reproduction can be just as well defined as the original; even the original captions can be legible when projected.

Consider also the Kodak Ektagraphic Visualmaker if you are operating on a limited budget. It comes equipped with an instamatic camera, a copystand, lens, and flash unit that will copy work three inches by three inches or eight inches by eight inches.

The script is prepared and the visuals, including the titles, are ready and loaded in the projector. All that remains to be done to complete the slide-sound program is to record the narration and any background sounds or music. Find a suitable location for this activity. A sound studio would be ideal, but if that's not available, select a setting that is isolated from external noise and frequent interruptions. Check out the acoustics of the room by making a short recording and playing it back with the volume control turned up. Listen carefully for any extraneous sounds that are being picked up and try to eliminate them. When you are satisfied that you have a quiet location for your recording session, assemble your equipment.

The level of sophistication of your program and the audiovisual equipment that is available will determine your equipment needs. You will need a slide projector, a reel-to-reel tape recorder or cassette recorder, a microphone, a slide projector, and the script. Additional equipment will be required for a more sophisticated program, including such items as a sound mixer, another record player, or tape recorder with music or sound effects on the record or tape, or a tape recorder/projector synchronizer. A word of caution—stick with the fundamentals and master them before you move into the higher levels of electronic gadgetry.

Set up your equipment. Place the projector as far from you as possible so the microphone doesn't pick up the whirl of the projector's fan or the sound of its slide change mechanism. If you are still picking up noise from the projector on your initial test recording, try to place a baffle (e.g., a cardboard box with a hole cut out for the lens) over the projector (keep adequate ventilation in mind). Place the microphone on padding thick enough to deaden any vibrations that might be picked up from movement within and outside of the recording area. The remote control unit for the slide projector, the tape recorder, and microphone should be close at hand. It also helps to have the script resting on a portable reading stand for easy reading (see Figure 2). Request the assistance of another person if you feel that the recording session could go more smoothly with another pair of hands.

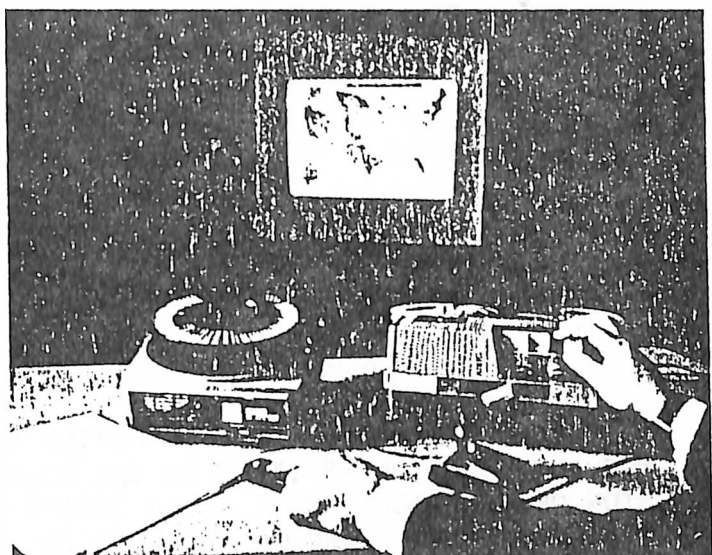


Figure 2

Several trial runs in recording the program will probably be necessary. As you move through the script, you will learn to pace the narration so that the show moves briskly. The cues for slide changes will be revised so that the length of time each visual remains on the screen will vary from slide to slide. A range of one to 15 seconds for the slide changes should be about right for maintaining the interest of the audience. Audible cues can also be recorded on the tape to communicate to the operator that the slide should be changed. This can be done with the tap of a pencil as each slide is advanced, but be careful that the audible cues don't detract from your show. As you record, check the recording indicator on the tape machine from time to time to see that it is set at an appropriate recording level. Handling the microphone properly can present a challenge. Try not to hold it too close to you; a distance of about one foot should be about right. Speak past the microphone rather than directly into it. By following these suggestions, your voice will sound more natural on the recording.

Careful preparation is required for the presentation of your slide-tape show. If you wait until your audience arrives before setting up and testing your equipment, a number of embarrassing surprises might await you—the electrical wall outlet may take a two-pronged electrical plug while the projector's extension cord has a three-pronged plug; the lamp in the projector may burn out as you turn it on; the slides may be loaded right side up in the carousel so that the images are projected upside down; the tape recorder's extension cord may not reach the electri-

cal outlet; the projector may be located too close to the screen so that the image projected is too small; the window shades may be inadequate for blocking out the sunlight; and, the seating arrangement may make it difficult for some of the viewers to see the screen. These problems can be overcome by setting up and checking the operation of your equipment well ahead of the time for the scheduled presentation.

When the audience arrives, tell them about the topic of your presentation and explain how it relates to the subject they are studying. Inform them of the major objectives of the program. This helps them to zero in on the more relevant aspects of the presentation. Don't overdo the introduction, lest the program become a lecture-slide-tape presentation.

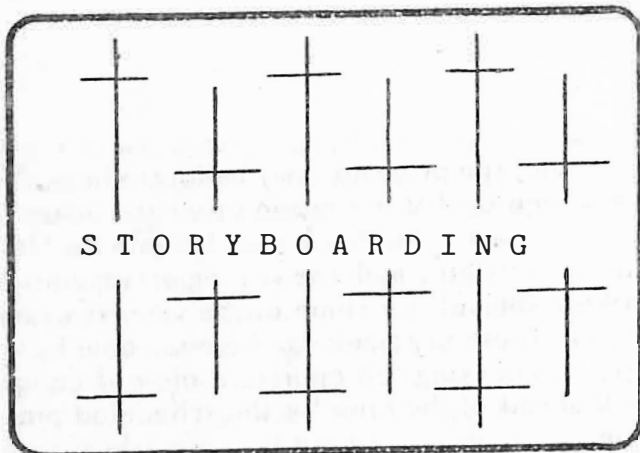
Whether or not the sound-visual program is aimed at introducing or summarizing a topic, the plans should include provision for a discussion of the topic after the showing. This requires you to prepare a few questions dealing with the topic beforehand. Responses to these questions from the audience will give you some indication of your success in achieving your goals and your success as an adventurer into a new medium.

Meeting the challenge of producing a stimulating slide-tape presentation can be an individual or group triumph. For the teacher who is interested in group activity, it offers opportunities for student planning and cooperation. One group might be assigned the job of searching for photographic material for the program. Another group could screen the incoming material. Other groups could prepare the script, shoot the visuals, do the recording, and operate the equipment. A test group could be organized to prepare questions for discussion or examination. Faculty and staff members from other disciplines could also be involved to make it a truly multi-disciplinary production.

The value of the slide-tape show as an educational and creative tool should not be underestimated. It attracts student attention, arouses interest, tests student understanding, and allows the teacher great facility of selection. Its versatility, ease of preparation, and low cost make it a valuable teaching medium.

*The author is Professor of Education at State University of New York in Binghamton. Art to accompany this article by Stanley Kauffman, Graphic Artist at State University of New York, Binghamton.*

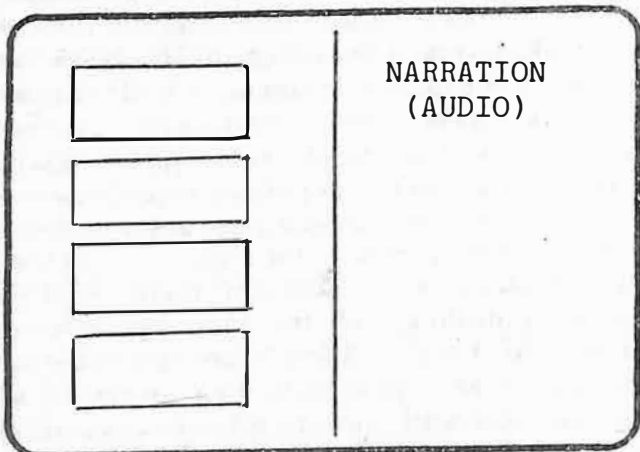
SCENE NO. \_\_\_\_\_



## STORYBOARDING

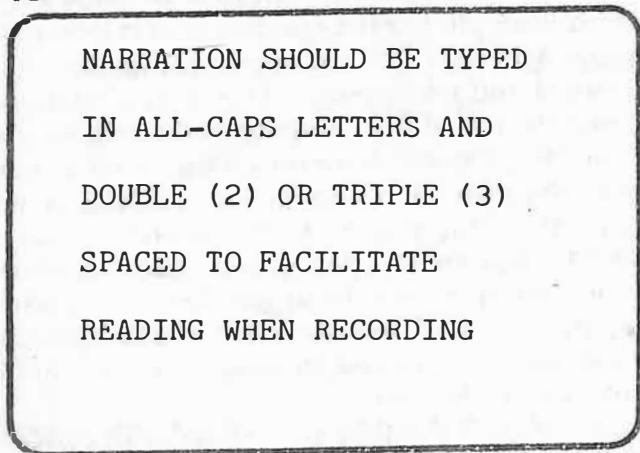
ANOTHER METHOD FOR STORYBOARDING  
USES THIS TYPE OF SCRIPT SHEET.

SCENE NO. \_\_\_\_\_



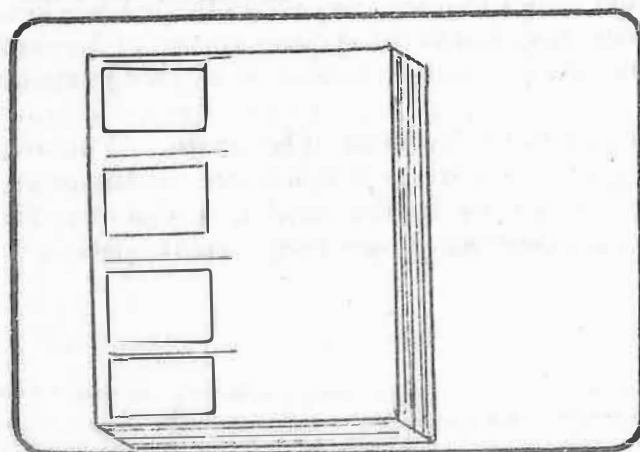
THE NARRATION OR AUDIO PORTION OF  
THE PRESENTATION IS TYPED ON THE RIGHT  
SIDE OF THE PAGE, AND A ROUGH SKETCH OF  
THE VISUALS AS DRAWN ON THE LEFT IN  
THE BOXES PROVIDED.

SCENE NO. \_\_\_\_\_



NARRATION SHOULD BE TYPED IN ALL  
UPPER CASE LETTERS AND DOUBLE (2) OR  
TRIPLE (3) SPACED TO FACILITATE READING  
WHILE RECORDING.

SCENE NO. \_\_\_\_\_



A BATCH OF THESE STORYBOARD SHEETS  
CAN BE DUPLICATED AHEAD OF TIME. AS  
PRESENTATIONS ARE DEVELOPED, THEY CAN  
BE ORGANIZED IN A THREE-RING BINDER.



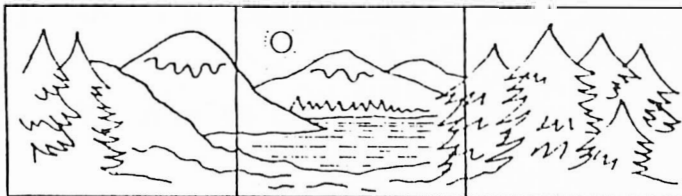
## APPLICATIONS OF MULTI-IMAGE

Slide/tape presentations are also effectively combined into multi-image presentations (presentations on more than one screen). This medium adds several important new dimensions to simple single-screen devices. Research is deficient so the effectiveness of these applications has not been validated yet. Great promise exists, however.

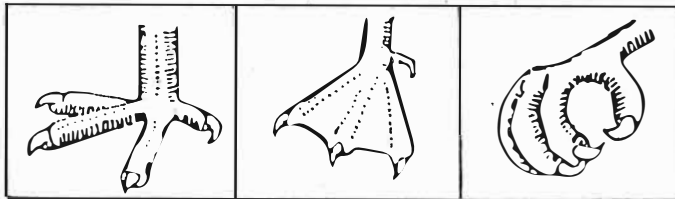
### PURPOSES SERVED

There are many informational and instructional purposes that can be served by multi-image presentations. Among these are:

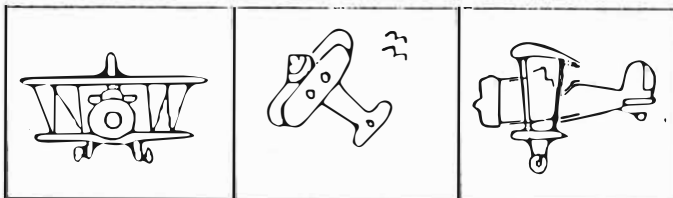
- Panoramic or wide view of a subject across two or more screens



- Comparing or contrasting objects and events



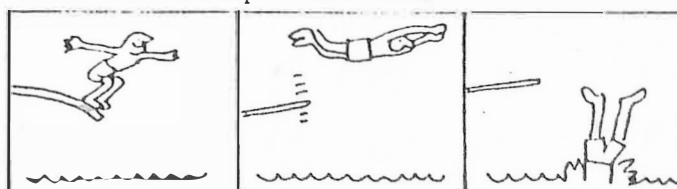
- Showing a subject from different camera angles or distances



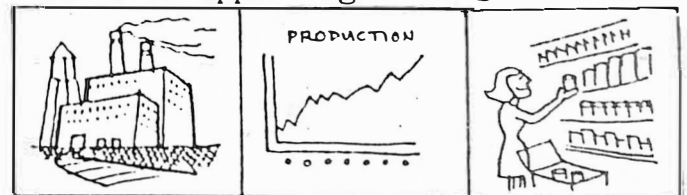
- Presenting sequential time segments relating to a single event



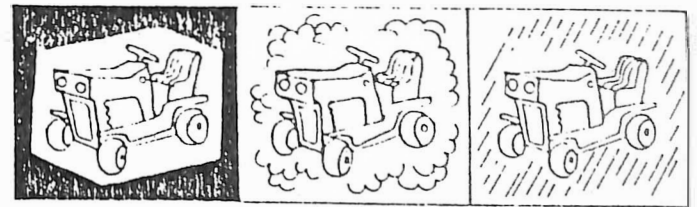
- Simulating motion of a still subject across multiple screens



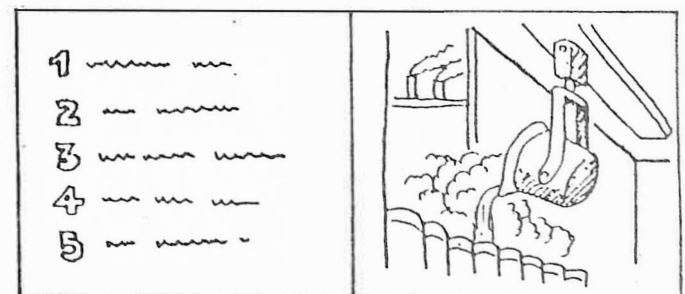
- Giving meaning to an abstract idea with several supporting visuals



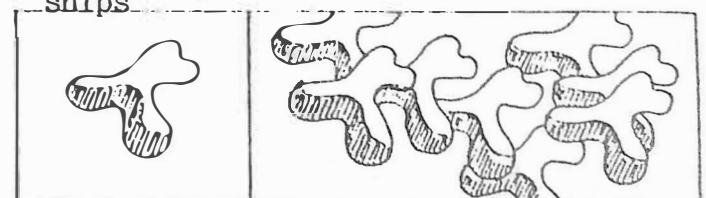
- Emphasizing a fact or concept by repeating identical images



- Illustrating relationships, such as parts to whole, form to function, model or diagram to actual object



- Developing concepts aesthetically, like growth, change, or interrelationships



FROM: Kemp, J. E. Planning and Producing Audiovisual Materials



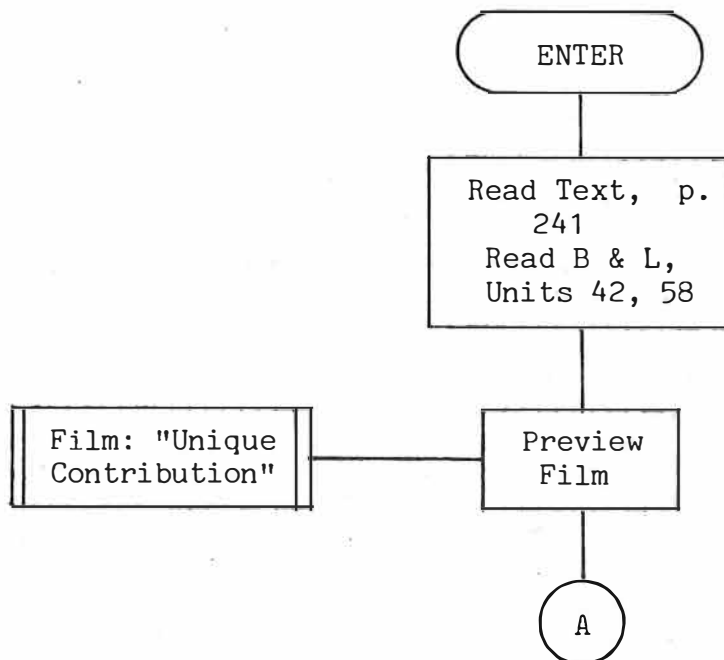


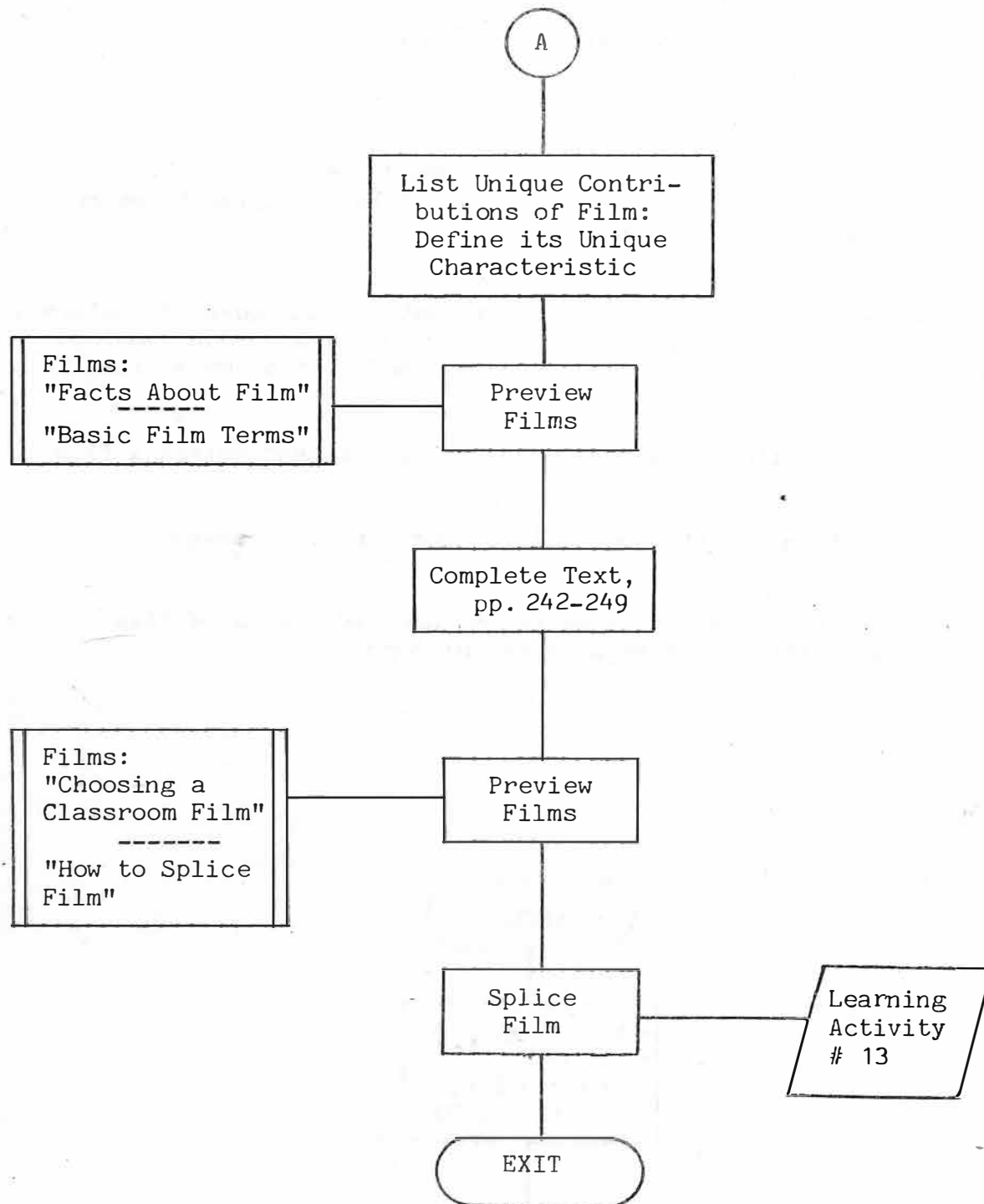
## INSTRUCTIONAL FILM

### Behavioral Objectives:

1. Be able to list at least three (3) fundamental characteristics, advantages, and disadvantages of instructional film, applying those rules to problems presented by the instructor.
2. Given the names of special effects, cinematic techniques, (timelapse, slow-motion, stop-motion, animation, microphotography and zooming) be able to identify their presence or absence when shown a film.
3. Given an instructional goal, be able to evaluate and select a film.
4. Be able to cite at least three (3) reasons for film damage.
5. Given a splicing block, splicing cement and two pieces of film, splice them together to form a permanent bond.

### Task Sequence:





## Instructional Film

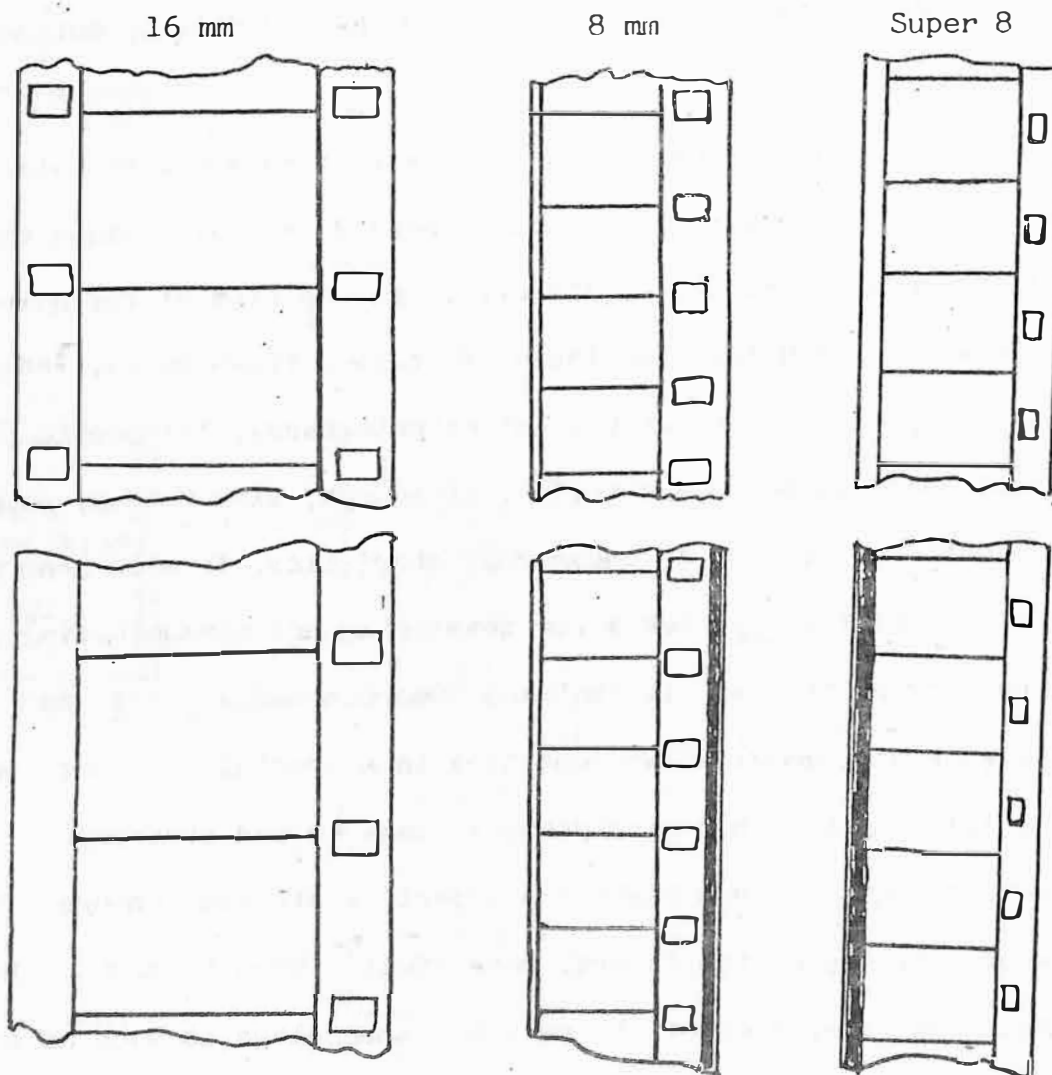
Thomas A. Edison said, "The only textbooks needed, will be for the teacher's own use. Films will serve as guide posts to these teacher-instruction books, not the books as guides to the films. Pupils will learn from films everything there is in every grade the lowest to the highest . . . Films are inevitable as practically the sole teaching method." Edison had an obvious bias. He helped develop motion picture projection.

In a historical context, we realize that Edison overstated the case for film, though the motion picture has provided several "unique contributions" to classroom instruction, as visualized in the film of the same title. It is capable of including time lapse, montages, flash backs, fades, background music, color, X-ray photography, microphotography, telescopic photography, abstract ideas in sound and motion, close-ups, slow motion, stop motion, and animation. Because of these characteristics, film is generally considered one of the best media for developing and communicating concepts and for changing attitudes. It contains numerous media codes, each of which are capable of communicating something in a special way, not only content that entails motion, but also general concepts and procedures. It has been found to be an excellent means for affecting attitude change. Witness the numerous agencies of the federal government. When in doubt, they produce a propaganda film, probably to convince themselves as much as anyone.

Beware! While it is easy to extoll the instructional virtues of film, concerns should be in evidence. These same codes make film a perceptually rich but potentially overburdening medium. So much information is presented simultaneously through the auditory and visual modalities, that many students, particularly the less mentally capable, are able to assimilate it all. For the students, special procedures including introductions, organization,

and repeat viewings are necessary to communicate the entire message. Learn what film can do, but beware. Like any other medium, it is incapable of assuming the full responsibility of instruction. Edison was a bit overzealous in his predictions.

Description of the Medium:



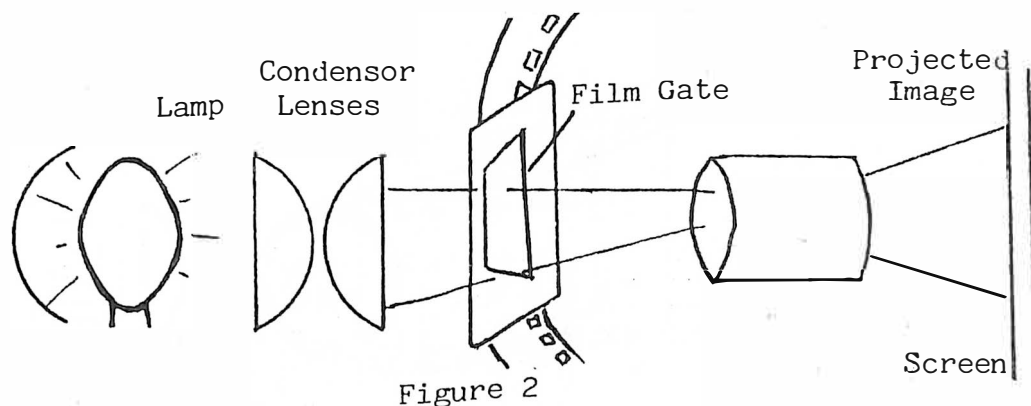
Instructional Films  
for School and  
Industry are normally  
16 mm

These Represent Home  
Movies, Student Pro-  
ductions, Visual  
Story-boarding

Commercial film productions are normally shot in 35 mm (over twice as large as 16 mm, with special Pana-Vision films using 70 mm film (super-wide and expensive)).

### Characteristics of the Medium:

When we look at a film, what we actually see are 24 separate pictures each second (each picture is shown twice, so we actually see 48). There is no such thing as true motion projection. Because of an optional process known as persistence of vision, each picture is temporarily "burned" on or retained on the retina for up to  $\frac{1}{4}$  second. To test this, look briefly at a bright light source (light bulb), close your eyes and the image remains for a few seconds. For less bright sources the images disappear more quickly. Before each film image disappears, the next picture (and 2 or 3 more) is perceived. Thus, the individual pictures blend together to form a sensation of motion. Light from a lamp is condensed into a beam which



shines through the film gate which holds each picture still for  $\frac{1}{24}$  second (see Figure 2). The image is projected through the lens, which focuses and enlarges it onto the screen. Each picture is pulled into position in the film gate by a mechanical claw that grabs the sprocket holes (see Figure 3).

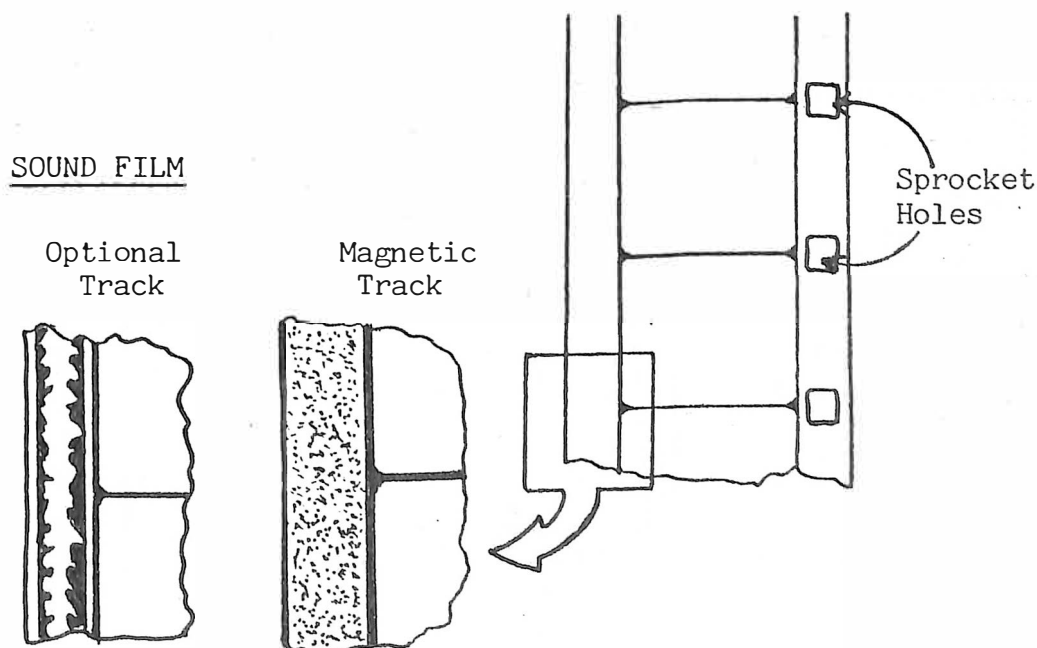


Figure 3

Sound is recorded onto film in two ways. (see Figure 3). On the edge of some films (8 mm and 16 mm) an iron oxide coating (just like the audiotape surface) is bonded to the acetate surface. Audio signals are then magnetized on the surface, just as a signal is recorded onto audio tape. This is known as magnetic track (or magnetic stripe) film, and requires a special projector to show such films.

More frequently, you will use optical track film. A variable density line is recorded (optically) on the edge of the film. An exciter lamp shines through the optical track onto the sound drum, projecting variable amounts of light which are electronically converted into various frequencies of sound. If you lose sound during film projection, frequently it will be the result of a burned-out exciter lamp, which is easily changed (see Figure 4).

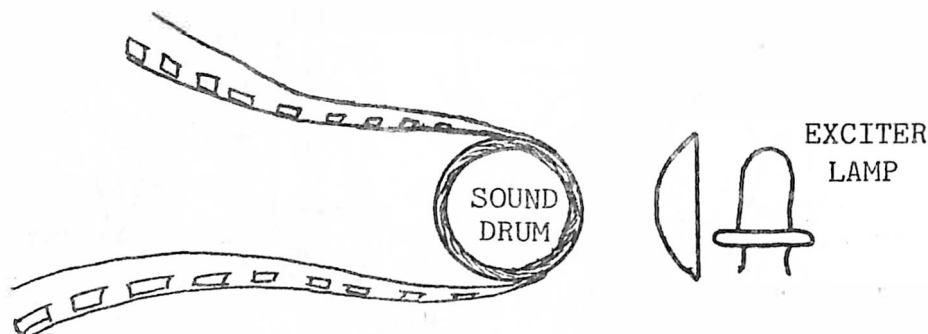


Figure 4

Standards provide that optical track precede the image that is coordinated with it by 26 frames. This is just far enough (Point A to B in Figure 5) so that the image on the sound drum being converted into sound is coordinated perfectly with the image being projected at the film gate.

So this complex machine, now automated, has been developed to project films, which can be effectively used for instruction.

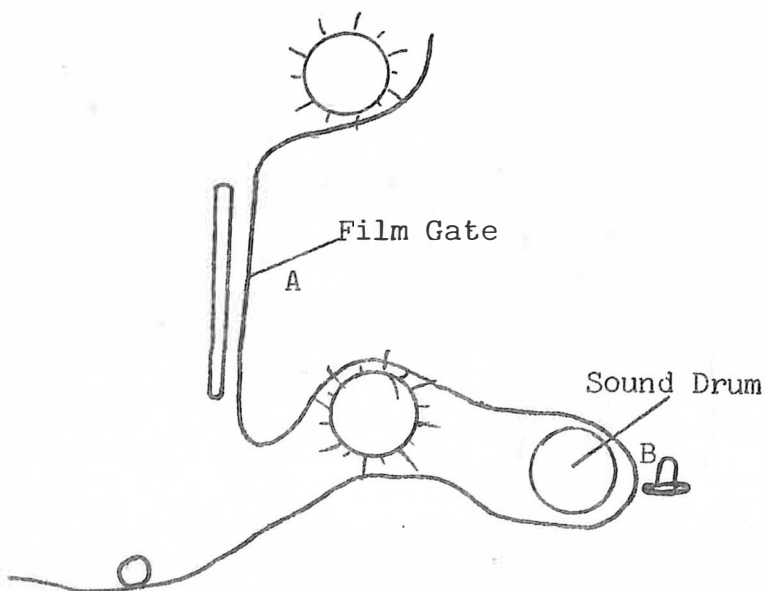
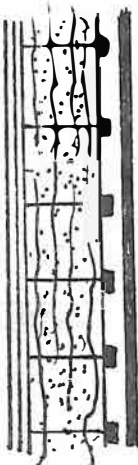

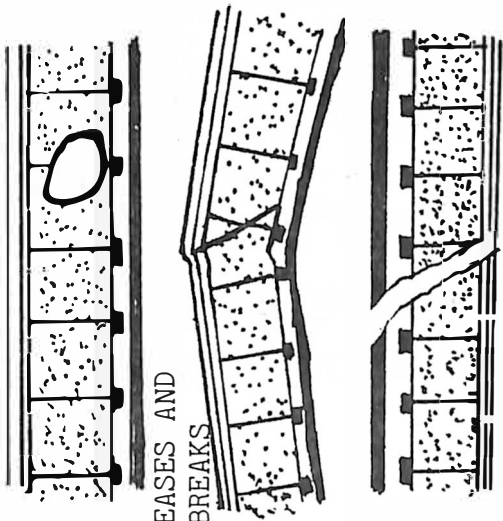


Figure 5

DAMAGES		CAUSES	PREVENTION
SCRATCHES		1. Dirt particles on rollers, film gate, or film channel 2. Rewinding film improperly 3. Tightening film after it is wound 4. Damaged reels 5. Cleaning film improperly 6. Improper threading	Your projector should be cleaned and properly lubricated. Film should be treated with care using rewinds and gloves to insure longer use. An important rule is <u>not</u> to tighten film on reel.
		1. Dirty projector 2. Careless handling of film surface 3. Continued use without cleaning 4. Improper or careless storage 5. Letting loose film fall on floor	Clean your film often and keep it stored away on a good reel, and always in a can.
TORN SPROCKETS		1. Dry film 2. Lose of film loop 3. Jerky movement of take-up reel 4. Worn sprockets 5. Too much tension on gate or take-up reel 6. Shuttle worn or out of adjustment 7. Improper threading	Synchronization while projecting will usually prevent most of your torn sprockets, although proper threading and readjusting shutter is essential in film care.
		1. Faulty or sticky fire shutter 2. Stopping projector for single frame showing 3. Projector running too slowly	A very important procedure in preventing "burning holes" is to shut the lamp before stopping your projector. And be sure to examine your fire shutter and adjust speed of projector.
CREASES AND BREAKS		1. Stepping on film 2. Loose film on floor 3. Careless rewinding of film 4. Pinching film while closing film can 5. Sudden jerk on take-up 6. Loss of loop 7. Film carelessly placed in film channel 8. Poor film splice	This is usually caused by permitting your film to fall on the floor. Always splice your film carefully. Tie the film down by placing a piece of tape on it.

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### Instructional Applications:

1. Factual films present ideas and information precisely, using pictures and sound together to clarify meaning.
2. Pictorial reports record events such as track meets or time-and-motion studies much as they occurred - with little or no editing.
3. Fictional drama films present stirring, believable versions of literary classics or other stories. They are especially useful in developing attitudes and in building appreciations.
4. True-drama films portray events in the lives of actual people.
5. Travelogues give sociogeographic information, usually of a quite general nature.
6. Training films are most often used to present how-to-do-it information related to the development of skills.
7. Documentary films attempt to tell true and accurate stories about real-life situations and real people.

### Advantages of Films:

1. Films combine "sight-in-motion" with various sounds. By acting upon two senses at once, they may contribute to effective learning.
2. Films help overcome intellectual barriers to learning. Ideas can be communicated which depend very little upon the skills of reading.
3. Films help to recreate the past.
4. Films provide "common experiences." Communication between members of a group is actually improved when references apply to film content all have experienced.
5. Films provide a continuity of action.
6. Films provide "front seats" for many learning experiences.
7. Films overcome many physical limitations to learning. Microphotography, telephotography, animation, and others extend the limited range of normal human experience.
8. Some films may be useful in testing.
9. Quality of film images and sounds (resolution of pictures, and more clear and distinct sound) are higher than for other motion media - (television).
10. Film generally offers the highest level of realism in reproduction of images.

### Disadvantages:

1. Cost of production is very high. Even rental costs are prohibitive for many users.
2. Production facilities are too costly and time consuming at a local level (8mm is changing this limitation).



### Disadvantages (continued)

3. Films are somewhat sensitive to environmental extremes (temperature and humidity). Breakage may result.
4. For lower mental ability students, the film medium is often too perceptually rich, i.e. too much information (verbal and visual) is presented, which causes an overtaxing of the students' channel capacity.
5. Rental of loaner films must usually be ordered too far in advance to be flexible.

### Utilization Principles:

1. Purpose - Provide the student with a purpose for viewing the film. Insert a "why" into the learning situation.
2. Important points - Provide the student with a list of important items to watch for during the viewing. This step could take the form of leading questions.
3. Demonstrate - If possible, the teacher should demonstrate any skills which are taught by the film.
4. Review - A review which explains abstractions, relationships, or subtle elements of the film should be promoted by the teacher but not dictated by the teacher.
5. Test - Of course, the only way to determine the effectiveness of the film's use is to test the student on the film. Often, this is the only way a teacher can determine if change has occurred in the student.

### Planning to Use a Film:

1. Identify learning problem.
2. Select appropriate film(s) based upon available information.
3. Order the film early (you usually have to).
4. Preview film (Don't skip this; if you have ordered a dog, it will be embarrassing to try to get out of it.)
5. Schedule equipment early (the day you need a projector, they'll all be signed out).
6. Set up the projector and thread the film before class. If you're uncertain about threading, Murphy's Law (if anything can go wrong, it will) will surely prevail after class has begun.
7. Use film when related to unit of study. They are also good reinforcers for productive sessions and less messy than lolli-pops.

### Previewing a Film:

This is an essential part of the film utilization process. Your need to establish a proper context for viewing a film. Having determined goals and objectives for a lesson, you need to preview a film to determine:

1. Overall concept of the film: Is this consistent with your goals?
2. Specific ideas presented: Are they related to number one?
3. Vocabulary and terminology: New terms need to be defined and explained if the film is going to maximize learning.
4. Possible discussion questions to be used to stimulate interest in the film or follow-up and review content of film.
5. Determine what related materials can be most effectively used in conjunction with the film. This is an important trend in film and TV utilization.
6. Special techniques employed must be explained to naive students. A small child watching a time lapse shot of a bean seed germinating and sprouting might go home, plant a seed, and wait through hours of frustration and disillusionment over its unwillingness to replicate the events he saw in the movie. With television watching increasing, children are becoming more visually sophisticated, but the "truth" or reality can be clouded by special effects.

### Research Concerning Film Utilization:

1. Note-taking during film watching should be discouraged. It distracts from the perceptually rich information being viewed.
2. Film series are superior in effecting change of both affect and attitudes as well as cognition.
3. Films alone (without a proper context or organized procedure) may teach some facts or skills. So simply "throwing a film on" to fill up time or substitute for a lack of preparation might be valuable, but there is at least an equal chance that it won't be.
4. Learning is increased when viewers know in advance what to learn. Popular pre-instructional strategies include pretesting, advanced organizers, and behavioral objectives. All can be effective if used properly.
5. Skills are best learned if repeated viewings are intersticed by some form of practice or exercise. Two viewings generally maximize learning. More than two result in diminishing returns.

## 8 mm FILM

8 mm film is a smaller format medium, operating at lower speeds with a lower resultant quality. This format, formerly only in the domain of home movies, is now used for local productions and when looped in small cartridges used as a primary instructional material. 8 mm film loops are also called single concept loops, as they are most frequently used to teach a single skill or concept, more often without any audio. They are obviously most applicable to individualized or small group presentations of a limited amount of information. In this course, they are used as a primary means of teaching basic production techniques and equipment operation.

## FILM SPLICE

### Assignment #13

#### BEHAVIORAL OBJECTIVE:

Given a guillotine splicing block, two pieces of film, and film cement, the student will permanently splice together the pieces of film, so that they will not separate upon bending.

#### PREVIEW: "How to Splice a Film"

During viewing be aware of the effectiveness of the film (despite its low production costs), a result of careful planning and creative thought.

Techniques employed include:

1. Repetition (the practice effect)
2. Audio cues for each step. Toward the end, verbal descriptions were absent, and the audio cues associated with each step stimulate a mental "filling-in" or covert verbal process.
3. Subjective camera angle (from the point of view of the splicer-- not a film about a splicer)
4. Humor
5. Progressive development or sequencing of small bits of information presented
6. Anticipation and disclosure of possible errors
7. Simple (visually and verbally) instructions

#### Production Steps:

1. Place one piece of film in right side of splicer and trim.
2. Place other piece of film in left side of splicer and trim.
3. Clean emulsion off of surface to be bonded.
4. Apply cement and quickly close splicer.

(Cut here and attach to assignment when submitted)

#### EVALUATION:

Name \_\_\_\_\_

#### Scale Range

#### Student

#### Instructor

0 - 5      Permanence of bond

0 - 5      Absence of excess cement

TOTALS

#### Grade Scheme:

9 - 10 = A

7 - 8 = B

6 - 7 = C

#### ADDITIONAL BIBLIOGRAPHY ON FILM

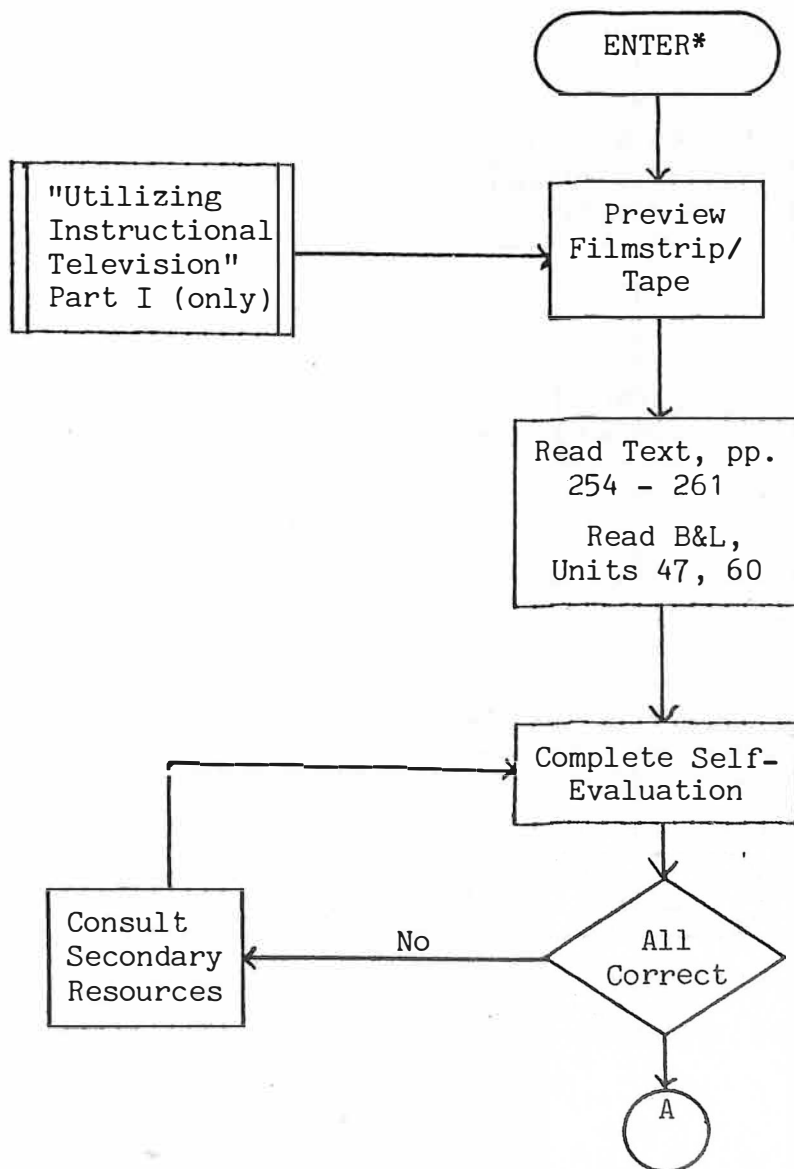
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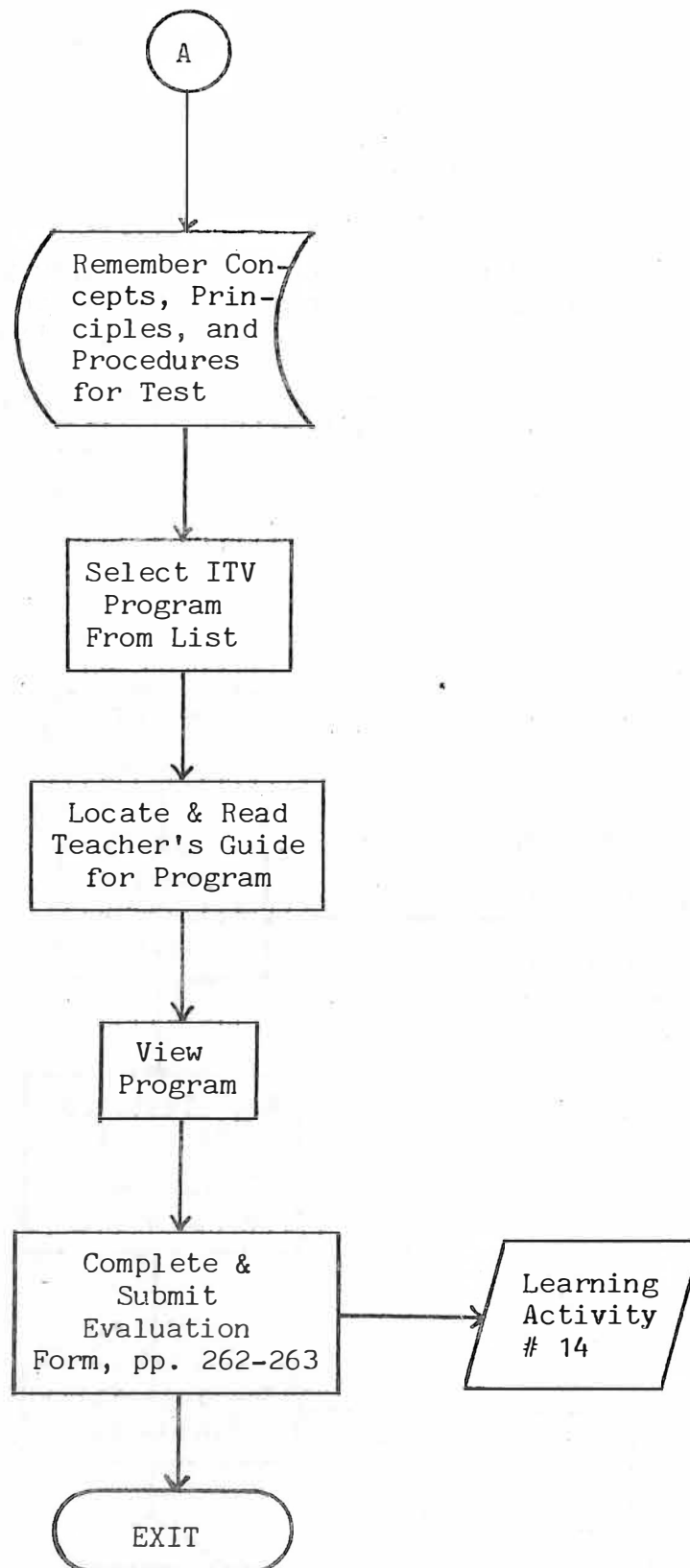
## EDUCATIONAL/INSTRUCTIONAL TELEVISION

1. Be able to distinguish between educational and instructional television programming by citing examples of each and explaining at least two differences.
2. Given a scheduled instructional television program, be able to properly prepare a class for viewing, conduct the television lesson, and engage learners in appropriate follow-up activities.
3. Given a teacher's guide, evaluate a regularly scheduled instructional program using an evaluation form.
4. Be able to define the following abbreviations: CCTV, CATV, ITV, ETV.

Task Sequence:



\* Having read objectives





## Educational/Instructional Television

Educational applications of television grew out of the commercial model. As audience size grew in the late 40's and early 50's, educators began to realize the communicative potential of this new medium. Educational television stations burgeoned in the early 50's, as a result of Ford Foundation and other funding, leading to the creation of the National Educational Television Network (NET) and later to the Public Broadcast System (PBS). Educational television has encountered many changes over the years. Countless research projects have studied its efficacy with desultory results. Millions of dollars have been poured into educational television projects that have failed to provide the panacea for classroom problems.

This unit will look at classroom utilization of educational and instructional television (there is a difference) as produced and distributed by an agency outside the classroom. Utilizing videotape recording facilities in the School for a variety of purposes will be dealt with in the unit on Videotape Recording. For purposes of this course they are considered separate entities, because of differences in utilization techniques, potential and challenges that each provides. Both can be valuable additions to classroom procedure; yet both can prove worthless if not used properly.

### Characteristics of Educational/Instructional Television:

Some definitions that will help to delineate the type and purposes of educational/instructional television are in order:

Educational Television (ETV). The concept of educational television has expanded and changed frequently during its 25 year existence. Beginning as a medium for distributing courses on college campuses, it grew rapidly. The major change occurred when the National Educational Television Network (NET) was formed. The variety of programming expanded to interest more viewers. Since then and culminating in the formation of the Public Broadcast System, ETV has evolved into cultural television, an "educational" (in the broad sense of the term) alternative to commercial entertainment networks. ETV programming is designed to enrich and inform the general public, its reputation resulting from its audience which is better educated and wealthier. ETV has

generally ceased to present course-related material, deferring to artistic series, and informational and public affairs programming.

Instructional Television (ITV). Course-related programming, presented in a planned, controlled sequence of programs defines the domain of instructional television (ITV). College, continuing education, or public school courses that are taken for credit often utilize ITV as a medium of instruction. The distinction between ETV and ITV can become somewhat cloudy because these newer definitions were derived from practice, not some immutable law.

Closed Circuit Television (CCTV). CCTV refers to the means of distributing the signal, not to the nature of the programming being broadcast. Closed circuit television signals travel through coaxial cable and can be received only by those receivers tied into the system. Closed circuit systems usually are found in single school buildings or across a campus. CCTV signals cannot be picked up by normal receivers. They are used for specialized purposes, e.g., transmitting lessons, surveillance systems, monitoring activity, etc. A type of closed circuit system intended for public audiences is:

Community Antenna Television (CATV). CATV is more commonly known as cable television. The principle is simple: a large, powerful antenna is erected to receive distant television signals. These signals are amplified and distributed via the cable (coaxial) to houses that are connected to the system. A fee is charged for the benefits of additional channels and clearer signals.

More recently, cable television has evolved into one of the potentially powerful communication media ever conceived. Using the cable to transmit as many as 121 distinct, separate signals, each home "on the cable" can be tied together through a central computer allowing each home feedback potential. This computer service could be used to order programs for immediate delivery on your set from a library of films and TV programs, interact with instructional television programs allowing student feedback, conducting instantaneous referenda, home merchandising (soon you'll order groceries or items from Sears on your hand-calculator-sized terminal), and even security systems tied into the police department. Cable will allow people to interact with the world without leaving their homes. The moral and philosophical issues implicit in such a system are almost incomprehensible, and as such beyond the scope of this course. Much literature is available on the future of cable television.

Broadcast Television. As opposed to closed circuit systems, broadcast television represents open circuit TV, available to anyone with a receiver tuned to the same frequencies (most commonly VHF, very high frequency, and UHF, ultra high frequency). Commercial television as well as public broadcast (ETV) stations broadcast their signals over the airwaves. While these signals carry for a distance of only 60 - 80 miles and are susceptible to interference, they are available for reception by anyone.

Instructional Television, Fixed Service (ITFS), Using a combination of broadcast and closed circuit distribution techniques, ITFS is normally used for transmitting instructional programming over distances. The most common examples are state instructional television networks. Signals are transmitted via special antenna at a frequency of 2,500 magahertz to special local receivers tuned to that frequency. These signals cannot be received on home TV sets. Having been received, they are distributed via cable to individual school buildings. The reason for this combination is the high cost of running coaxial cable over long distances. It is cheaper to transmit over a special frequency to local agencies.

Figure 1 describes the relationship of the different forms of television defined above.

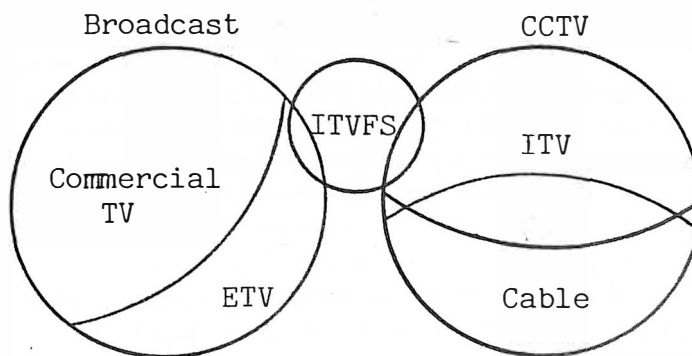


Figure.1. RELATIONSHIP OF TV SIGNALS AND PURPOSES

### Characteristics of Educational/Instructional Television:

1. It is a mass medium. Large numbers of learners can be accommodated simultaneously.
2. Programming is normally produced by professionals and distributed from a central location.
3. Programming runs the gamut from cultural to hard core instructional.
4. It may distribute partial or complete courses.

### Advantages of Educational/Instructional Television:

1. Involves a production team approach, utilizing skilled, professional educators and producers.
2. Instruction on a wide variety of subjects is available.
3. Sophisticated audiovisual materials not available to the normal classroom teacher may be used. Television is the one medium that can utilize all other forms of media in its productions.
4. The most qualified and skilled teachers are used to teach television lessons.
5. Television provides a way for you to bring local experiences into your classroom--the kindergarten, the brickyard, the veterinary hospital, the department of social services. Don't just talk about things--show them.

### Disadvantages of Educational/Instructional Television:

1. Television is one-way communication. The student is unable to ask questions, the teacher unable to judge his performance from student reaction. (Follow-up is important with every mediated activity, television included. The teacher must be sure the students have "gotten the message" and he must evaluate the program for future changes.)
2. Television is normally viewed passively and students do not participate. (Why not provide for student response--possibly use a mimeographed handout, allow time on the tape for responses, then provide the answers so the students can evaluate themselves.)
3. Television runs at a constant rate--it cannot be slowed for the slow learner, speeded up for the fast learner. (Television is largely a group activity, like the lecture, which aims for the average student. Special programs must be developed for students with special needs.)
4. Because of this fixed flow presentation, television is difficult to adapt to individual learning.

#### Disadvantages (cont'd)

5. Television programming is time-consuming in the short run, (though often time-saving in the long run). To produce a valuable program, extra hours are required on the part of the television teacher. (However, once the program is "in the can", the teacher is free during the time he would normally need to teach that content again in the future.)
6. ETV/ITV is normal broadcast on a rigid time schedule. If you're teaching French class at 10:00 a.m. but the French lesson isn't aired until 2:00 p.m., you're generally out of luck.
7. The focus of the television lesson is on the teacher, not the pupil. Pupil reception is assumed, sometimes without reason.
8. Like any mass medium, all pupils receive the same message and are expected to react in the same way. For this reason, critics claim that it breeds standardization and uniformity among students.

#### Principles of Utilization:

1. To extend instruction
  - a. one instructional presentation can serve several classrooms simultaneously or several classrooms at different times
  - b. classes can be served at a time no instructor is available
  - c. experiences can be brought to class when the class cannot go to the scene
2. To preserve material
  - a. outstanding educational presentations can be kept for future use
  - b. teachers can expend a little extra time above what they normally allow for a presentation and tape a superior presentation which can be used for future classes and in future years, thus freeing themselves later for other activities
3. To provide for individual learners
  - a. instruction which cannot be fitted into existing classroom schedules can be made available for individual needs
    - 1 - remediation
    - 2 - enrichment
  - b. review materials can be made available for students who need it
4. Check the broadcast schedule well ahead of time. Order equipment early if it is not readily available in your class.
5. Have the school order teacher's guide for all series intended to be used. These contain valuable information on lesson goals and content as well as suggested follow-up activities. These activities may well make the difference between just another TV show and a meaningful learning experience.

## Principles of Utilization (continued)

6. Establish new contingencies in your classroom for watching instructional television. Preach the instructional resource concept to pupils (see Introduction). Make sure that they are aware that this television show is a valid learning experience. Use advanced organizers or give them outlines of the show's contents. Pretesting pupils on lesson content (promising a posttest as well) is a valid pre-instructional strategy that may well make the difference. Students can't be allowed to view ITV with the same indifference as commercial. The latter experience is so passive, their brains are on "hold." This type of reception is obviously not conducive to learning.
7. Research on production techniques based on Godwin Chu and Wilbur Schramm (*Learning from Television*, National Association of Educational Broadcasting, Washington, DC, 1968: in *Classroom Television* by George N. Gordon. The following has been edited, rephrased and renumbered by Gordon) generated the following conclusions:
  - a. Children are able to learn from ITV.
  - b. ITV seems more effective in elementary and high schools than in higher education.
  - c. ITV can be successfully employed in teaching any subject matter involving one-way communication.
  - d. ITV works best in a "suitable context" where classroom activities accompany its use.
  - e. ITV's most efficient uses involve, usually, the solution of large educational problems and broad educational support, as in total school systems, school systems in deprived nations, or in solving difficult educational problems.
  - f. Good planning and organization are necessary for the successful use of ITV.
  - g. Screen size makes little difference in ITV's contribution to learning, and the specific advantages of color TV have yet to be determined.
  - h. In teaching skills, a subjective (or "viewer") orientation seems to work better than an objective (or "show and tell") approach.
  - i. Evidence does not suggest that any particular sort of TV production techniques produce better learning than any other one; the clarity and continuity of visual materials appears relevant to learning, however.
  - j. Production values (or "attention getters") irrelevant to subject matter, will probably impede rather than stimulate learning.
  - k. Neither humor nor animation techniques appear relevant to learning from ITV, although subtitles tend to improve student responses, particularly to poorly organized lessons.
  - l. Dramatic presentations, the insertion of questions into the lesson, and using ITV at the beginning or end of classroom periods all seem irrelevant to effectiveness.

- m. A pause for rest at strategic times and repeated showings of TV lessons probably help learning, although live teacher follow-up is preferable to repeated showings of the same video lesson.
- n. No evidence exists that so-called "eye to eye" contacts between TV teacher and student have any effect on learning.
- o. Neither lectures, interviews, or panel discussions are clearly superior methods of ITV production one to the other, although programs designed in the problem-solving format excel in teaching problem-solving techniques (sic).
- p. Distance and width of viewing angle impede learning from ITV when clear perception of images is critical (sic), although a classroom teacher can help to encourage pupils to provide good attention to wide angle photography.
- q. Size of viewing group does not seem to effect ITV learning.
- r. Factors other than ITV itself seem to influence the effectiveness (or lack of it) of homogenous grouping, studying by TV at home, etc., although permissive attendance does not appear to influence the effectiveness of ITV on the college level.
- r. Motivation is critical to the effectiveness of ITV.
- s. The absence of immediate feedback from a teacher does not appear to affect learning by TV, although the opportunity to ask questions in live classes (or on talkback systems) seems significant in teaching advanced or complex materials. And students taught by ITV miss personal contact with living teachers.
- t. Time for note-taking should be provided in ITV lessons, if note-taking is considered desirable.
- u. Elementary school children like ITV more than high school or college students; administrators like ITV more than teachers.
- v. On the college level, students like small discussion groups better than an ITV class and prefer small ITV classes to large lecture sections.
- w. Students like and dislike such a wide range of ITV courses that no conclusion may be made that certain disciplines produce negative attitudes, although liking an ITV course may be irrelevant to how much a student learns from it.
- x. Teacher's attitudes toward ITV depend upon a) what they imagine its threat to classroom teaching to be, b) their attitudes toward mechanized instruction, c) the value they ascribe to ITV, d) the difficulties they imagine are involved in educational technology, and e) their degree of conservatism.
- y. Pupil's attitudes towards ITV depend upon a) the amount of contact they think they will have with living teachers, b) the difference between attitudes of live and TV teachers, c) how much interest they have in the ITV lessons, d) their attitudes toward TV, and e) viewing conditions.

Also - - 1) Children seem able to learn because of (or in spite of) the use of all so-called "instructional media."

2) There is no inherent difference in learning from TV or filmed lessons, although TV may be employed more flexibly than film in most instances, but classroom teachers can control film showings (usually) better than ITV lessons.

3) Visual images seem to help learning manual skills and some other types of material, but visual images may sometimes be distractive and impede learning, unless moving visual images are germane to the subject matter to be learned.

#### ACTIVITY # 14

##### Evaluating ETV/ITV

An Axiom: You should not assume that all television programming that is broadcast is good or valid.

##### Procedure:

1. Consult the public broadcast schedule (UNC-TV, Channel 4) and select an instructional program of interest to you (daytime schedule only). This program should be aired at a time that you are able to watch it.
2. From the Television file, locate the teacher's guide for that series and locate the program in the guide scheduled for broadcast that day.
3. Read the guide for the particular program you have chosen. Pay particular attention to the instructional goals/objectives that are stated for the program.
4. View the program in an undistracting environment.
5. Complete the Evaluation Form on the next page and submit it to the instructor.



# ITV Evaluation Form

Program Title: \_\_\_\_\_ No: \_\_\_\_\_ Series Title: \_\_\_\_\_

I. Lesson Objective (from Teacher's Guide): \_\_\_\_\_

## II. ITV Program Purpose

- |                     |  |           |  |
|---------------------|--|-----------|--|
| 1. Program Content: | a. Meaningful  | 1 2 3 4 5 | Irrelevant                                     |
|                     | b. Similar to<br>Stated Goal<br>(Objective)<br>for Program | 1 2 3 4 5 | Inconsistent<br>With Stated<br>Program<br>Goal |
|                     | c. Explicit  | 1 2 3 4 5 | Unclear  |
|                     | d. Appropriate<br>for Age                                  | 1 2 3 4 5 | Too Hard/<br>Easy                              |

Total Points \_\_\_\_\_ ÷ 4 = \_\_\_\_\_

## III. ITV Program Attributes (Complete after watching program)

- |   |                                 |           |                                    |
|---|---------------------------------|-----------|------------------------------------|
| 1. Redundancy of Important Points:              | Repeated<br>Frequently          | 1 2 3 4 5 | Never<br>Repeated                  |
| 2. Relevant Instructional Prompts, Cues Used:   | Frequently                      | 1 2 3 4 5 | Never                              |
| 3. Rhetorical Questions:                        | Used<br>Frequently              | 1 2 3 4 5 | Never<br>Used                      |
| 4. Inserted Questions:                          | Used<br>Frequently              | 1 2 3 4 5 | Never<br>Used                      |
| 5. Reinforcement or Feedback:                   | Followed<br>Questions           | 1 2 3 4 5 | Never<br>Followed                  |
| 6. Production Techniques:                       | Appropriate<br>for Age<br>Level | 1 2 3 4 5 | Too Juvenile<br>or Too<br>Advanced |
| 7. Primary Presentation Technique:              | Dramatic or<br>Visualized       | 1 2 3 4 5 | Lecture                            |
| 8. Pacing:                                      | Lively                          | 1 2 3 4 5 | Dull                               |
| 9. Overall Appeal:                              | Humorous,<br>Happy              | 1 2 3 4 5 | Dull,<br>Uninviting                |
| 10. Types of Sequences Used Throughout Program: | Variety                         | 1 2 3 4 5 | Same Format                        |
| 11. Music:                                      | Used<br>Frequently              | 1 2 3 4 5 | Never<br>Used                      |
| 12. Peer-Aged Actors Used:                      | Frequently                      | 1 2 3 4 5 | Not at all                         |
| 13. Animation Used:                             | Frequently                      | 1 2 3 4 5 | Never                              |

Total Points \_\_\_\_\_ ÷ 13 = \_\_\_\_\_

(Are averages similar?)

State Program Strengths \_\_\_\_\_

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State Program Weaknesses \_\_\_\_\_

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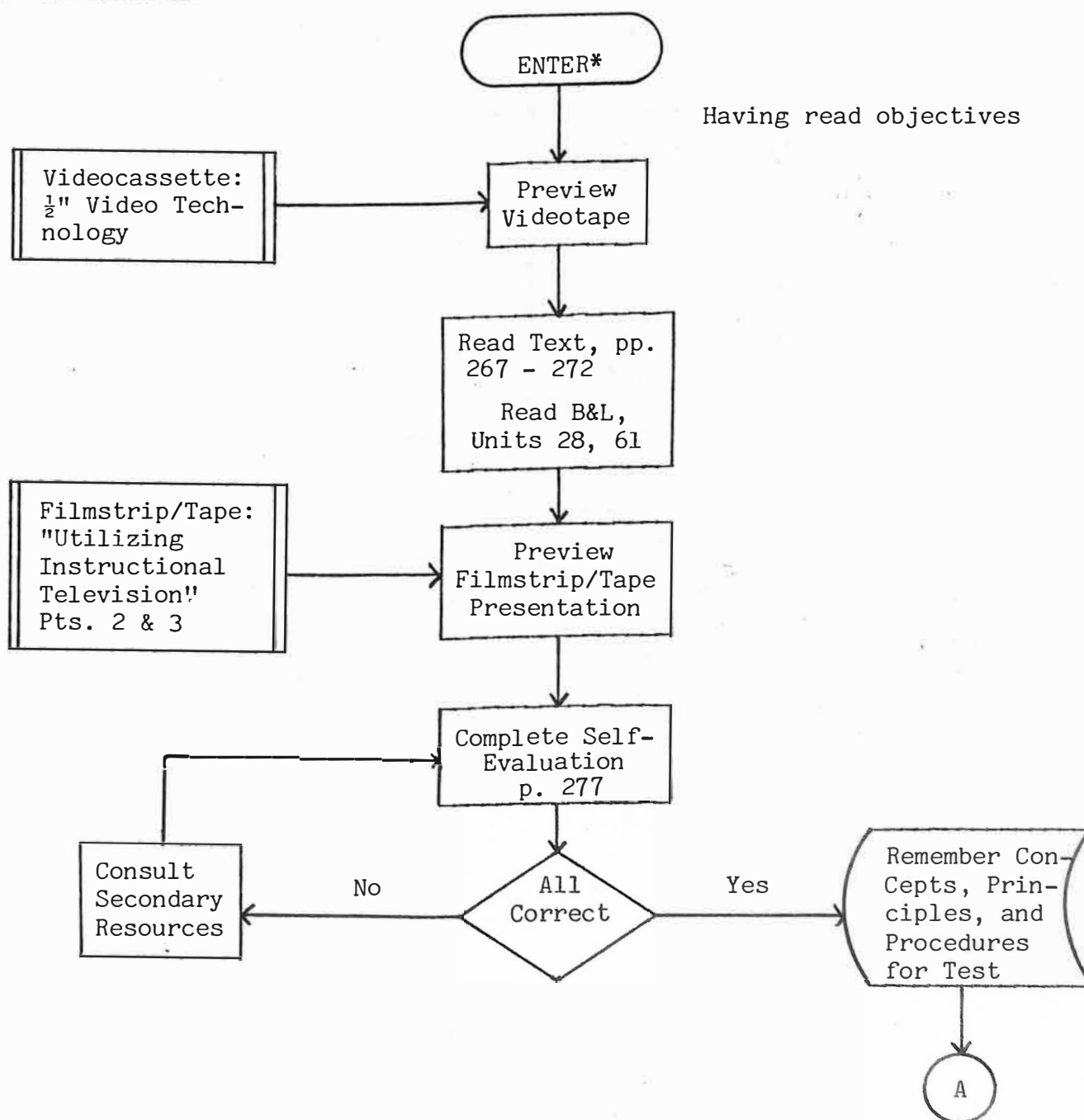
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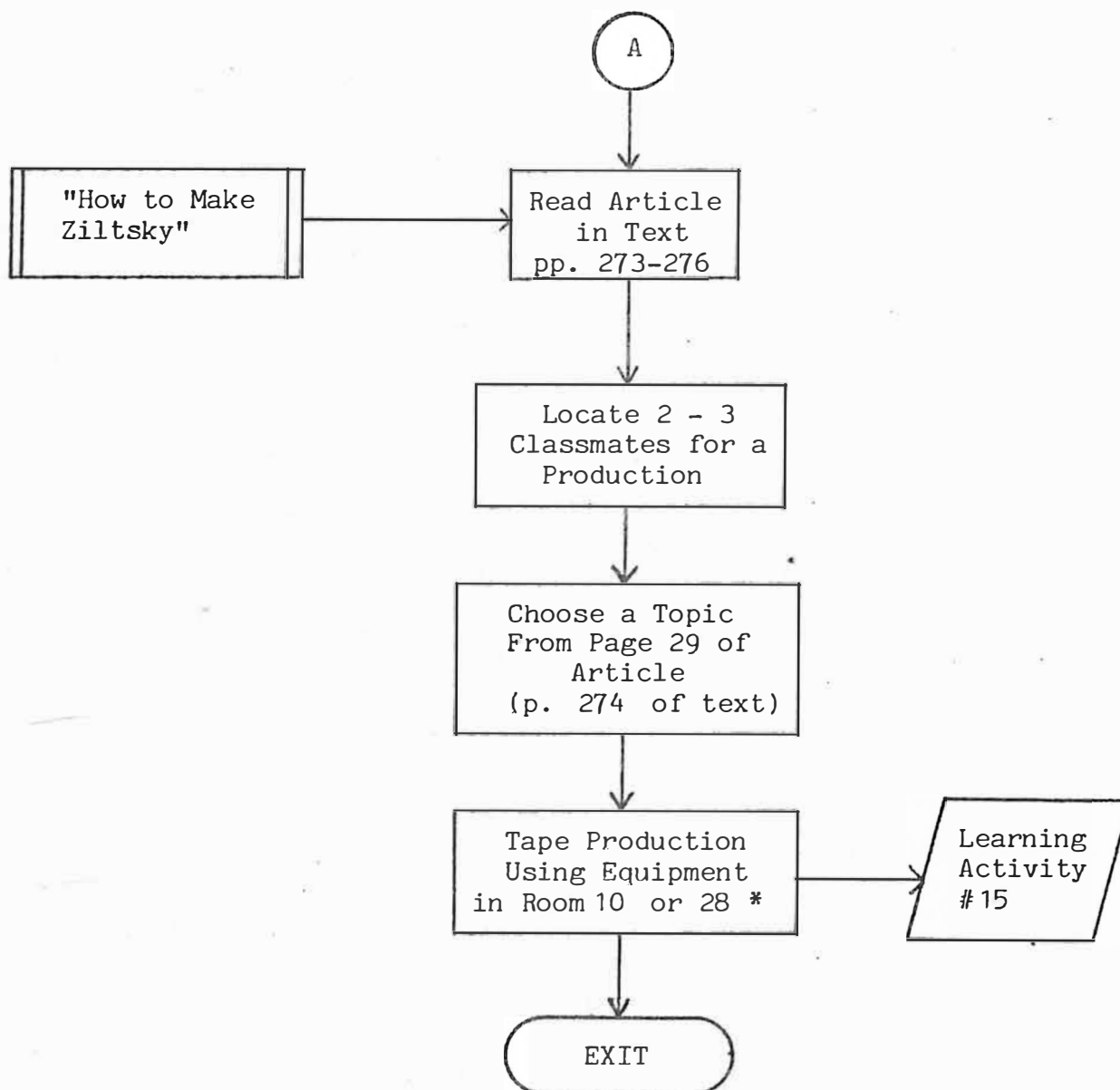
## VIDEOTAPE RECORDING

### Instructional Objectives:

1. Be able to discuss the advantages of local VTR systems over broadcast instructional television.
2. Given a porta-pak, a half inch or three quarter inch VTR system (including recorder, camera, and monitor), record a brief prepared presentation including yourself and peers.
3. Be able to define: EIAJ.

### Task Sequence:





\* Don't forget to include in "credit" title card, listing names of participants, to insure course credit for activity.

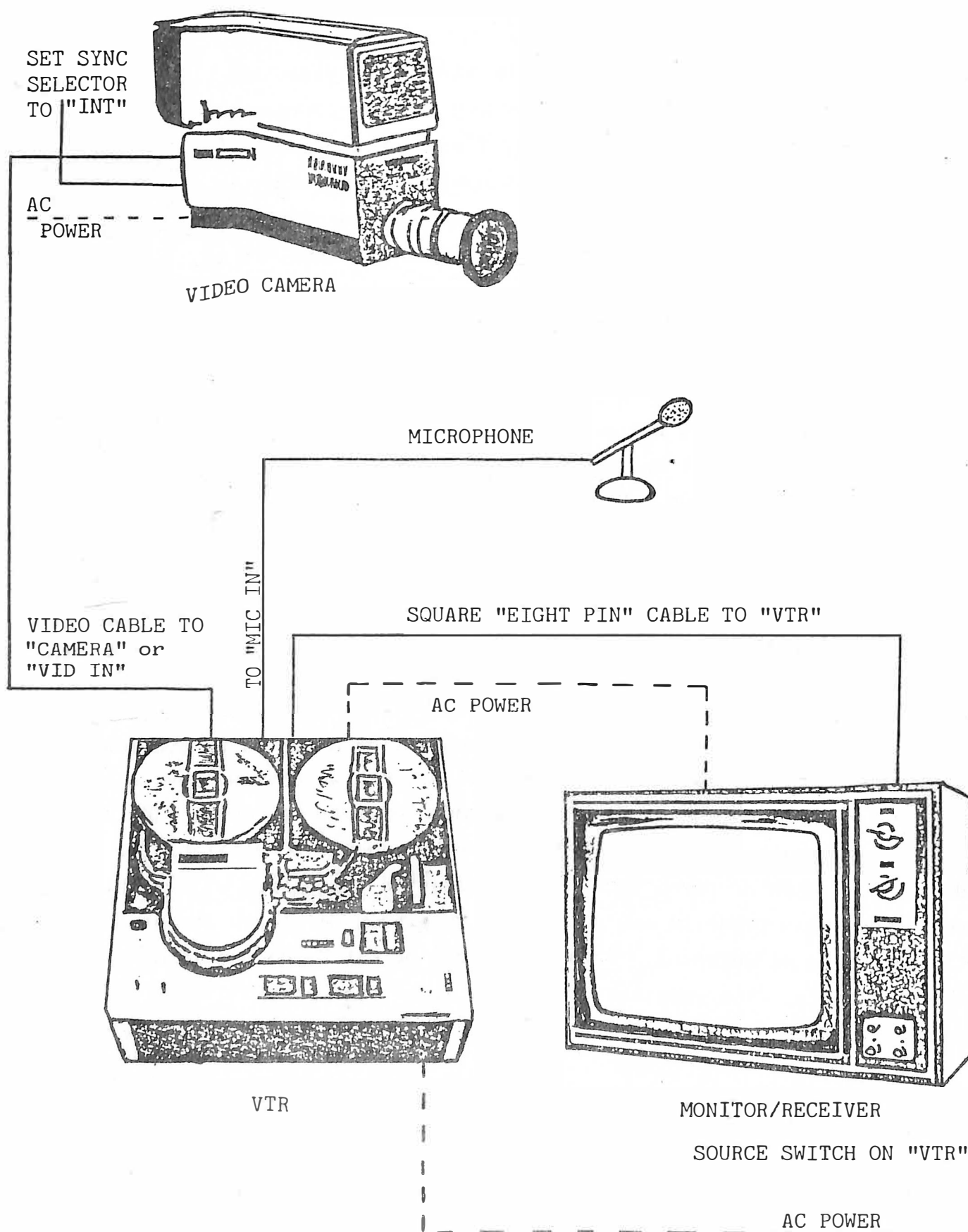
## VIDEOTAPE RECORDING

As should have been obvious from the videotape, videotape recording is a simple practice. Your exposure to recording in this course will be limited to a "single-camera-system" (see Figure 1), i.e., a video recorder, single camera, and monitor. As shown in Figure 2, this system can be augmented to include a more sophisticated array of equipment. However, as a neophyte, you'll do well to make a simple tape. These other production techniques are the subject of other courses.

With the advent of videotape in the 50's, television became a new medium. Televised images could be presented or further manipulated to increase their message-carrying capability. As tape became smaller and helical scanning became prominent, equipment became cheaper and simpler to operate, allowing schools and other institutions to get into the TV business. The instructional implications are tremendous. Students have the opportunity to manipulate one of the most powerful media ever developed.

In the second unit of this text, you learned about the communication process, how meaningful communication had to be cyclical or two-way. The teaching process is not complete unless we receive feedback from the students that indicates the effectiveness of our lesson. In schools, increasing use is being made of educational/instructional television as a primary medium of communication. So, if we believe that communication needs to be cyclical, and we use television as a medium of communication, then we should provide television as a medium for the student to feedback to us as teachers. The same medium of communication available to the teacher should be available to the student. Half inch or three quarter inch cassette television allows this to happen. Countless projects and activities have been developed for student participation in videotaping. Doing the Media by Kit Keybourne is an excellent example. The emphasis of student video feedback should be on experimentation.

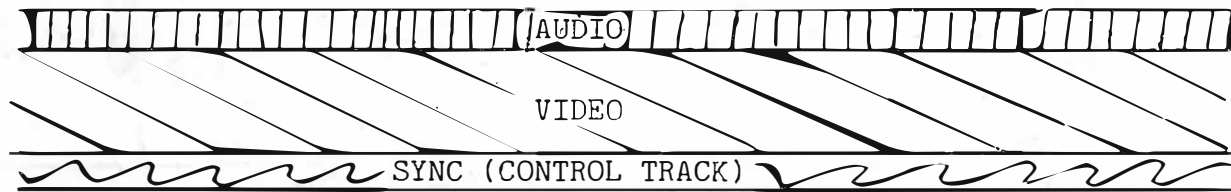
Figure 1. SINGLE CAMERA VTR SYSTEM





### How Television Recording Works:

#### 1/2 and 3/4 Inch Helical Scan Videotape System (Reel-to-Reel and Video Cassette)



Auditory and visual information are recorded onto an oxide coating on videotape. Since the tape is slanted downward as it crosses the video "heads" (guides direct it at an angle), it is called helical scan. Lines of electronic signals are recorded on the video track. Since audio frequencies are much lower than video, the audio track on the tape is much smaller. The control or synchronization track (electronic signals that record the speed of the machine and other electronic variables) controls the recording and regeneration of video signals.

TV camera accepts visual information through lens concerning the scene to which it is exposed, by scanning (breaking image down into 525 lines) the image that appears on the vidicon tube. An electronic signal is transmitted to the VTR (videotape recorder) where it is electronically recorded onto videotape (see above). Each line of video recorded on tape produces one line produced on TV screen.

Each TV frame or picture consists of 2 fields. A field consists of all the lines accumulated after a single top-to-bottom scan of a picture has been made by the electronic beam in the camera. The beam scans only every other line in a single sweep (field). A complete picture requires 2 sweeps or fields. Thus, a field is 1/2 a frame, or 262 1/2 lines.

Recording the picture consists of feeding the television signal to the video heads. This creates a magnetic field which is recorded onto the tape. The heads pick up the magnetic impulses during playback and convert them back to the original picture signal. The signal, which is a pulsating electric current, is fed into an electron gun in the rear of a receiver (TV set). The gun fires a beam of electric particles at the screen which is coated with a phosphorescent substance. The gun scans the screen with the beam from top to bottom, just as the image was picked up off of the surface of the vidicon tube. As the particles hit the phosphorescent surface of the screen, they



cause it to give off energy in the form of light. The varying current gives off varying amounts of light, creating the picture as we see it on the screen.

The TV camera is the encoder; the receiver is the decoder.

The Electronics Industry Association of Japan (EIAJ), representative of the major manufacturers of portable video equipment, standardized this scanning pattern for all 1/2" machines in 1971. This was known as the EIAJ Type 1 standard and meant that a tape recorded on one manufacturer's VTR deck could be played back on another manufacturers deck. A similar standard has been subsequently established for the 3/4" U-Matic Cassette. Another will probably standardize the new 1/2 cartridges (eg., Betamax cartridges). This innovation has greatly expanded television utilization in schools.

#### Characteristics of Videotape Recording:

1. Provides immediacy. Messages or images can be recorded and played back immediately.
2. Videotape can be reshown as many times as desired. It can also be erased and re-recorded as many times as desired.
3. Videotape recording can capture human behavior and emotion. It can mediate the interaction between individuals.
4. As a feedback mechanism, it allows individuals more objective access to their own image or behavior. You can see yourself as others see you. It is a "mirror with a memory."

#### Advantages of Videotape Recording:

1. Allows for easy revision of content. Simply erase any portion of a tape and record again.
2. Can be used to expand teacher growth. Videotape yourself while teaching; watching the playback will probably teach you more about teaching and human interaction than most university courses. The lesson is not always easy, but it's inevitably valuable.
3. Can provide high level of motivation for student participation.

#### Limitations of Television (ETV)

One way communication channel -  
limited feedback qualities  
Difficult to adapt to individual  
needs  
Breeds standardization and  
uniformity  
Rigid time schedule  
Focus on teacher, not learner  
Loss of pupil - teacher  
contact

#### VTR System Adaptation

Students are initiators of programming -  
not simply receivers  
Programming to and by individuals  
for individuals  
Diversity of input yields individualized  
programming  
No time schedule  
Student in focus, teacher passively  
involved  
Teacher and pupils involved in producing

### Disadvantages of Videotape Recording:

1. It may produce a major distraction from normal classroom procedures. Some would see this as an advantage, however.
2. Motivation for videotape recording may be so high as to obviate other activities.
3. Equipment is sensitive to high temperature and humidity. On such days in a facility that is not air-conditioned, don't even try.

### Principles of Utilization:

1. Store videotapes in a cool, dry location away from magnetic fields.
2. Hook up camera directly to monitor to magnify demonstrations or illustrations. Several students crowded around a lab table are unable to participate or even see a process. Focus the camera on the process (eg., dissecting a frog) and show it through the large monitor.
3. Tape the previous procedure and save it for review by individual students or groups.
4. Record programs off-air. Beware of copyright restrictions. Most programming on the Public Broadcast System can be legally recorded for short term classroom use.
5. Analyze teaching performance or student performances on speeches or other presentations by taping them.
6. Record and analyze sports events. Don't let the coaches keep the tape, though. There is little advantage in documenting the event, but using the tape as feedback on team or individual performance is valuable. VTR equipment can be better utilized in practice than during a game.
7. Let students experiment or tape reports or "term tapes" (rather than term papers). The amount of work involved is greater, and the results can be shared with the class.

Countless numbers of activities exist. Write to the 3-M company for a "Guide to the Use of Instructional Television with the Classroom Teacher." Many pages of activities are listed.

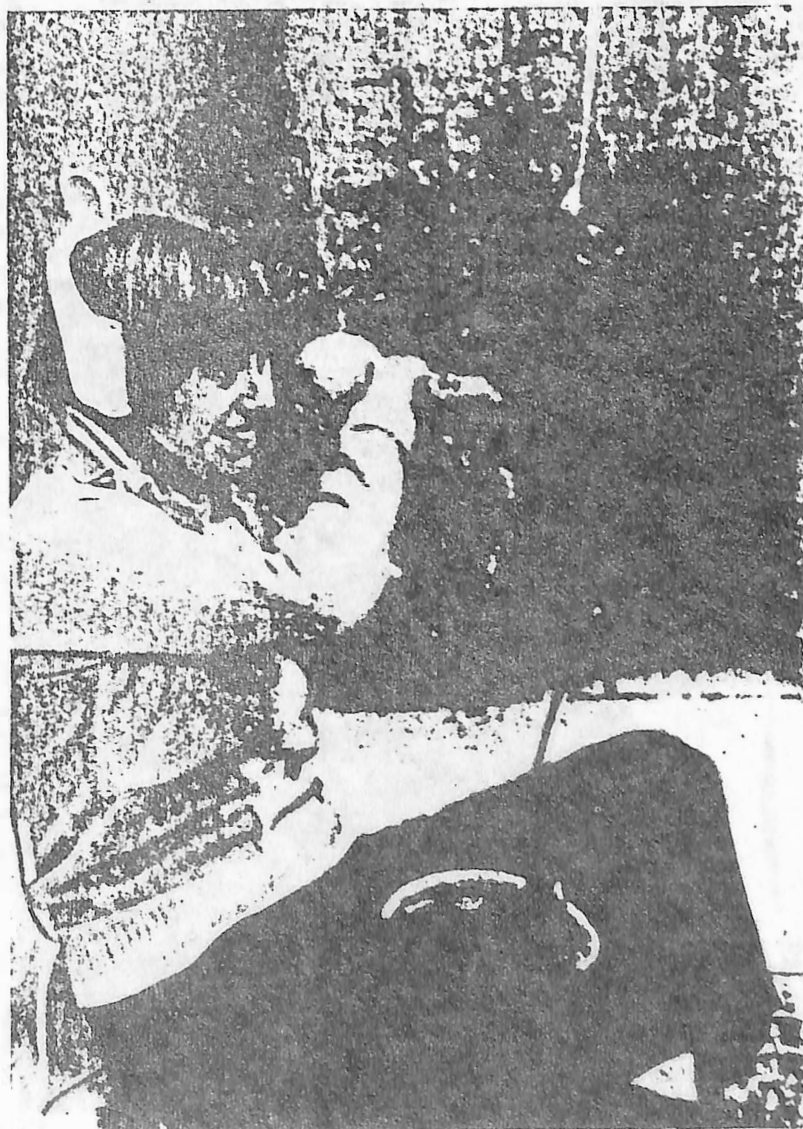
# How to

**T**hough a course in instructional television is offered in our Library Science/Educational Technology (LS/ET) Division, it became apparent that we needed at least an introductory experience with the videotape recorder (VTR) in one of the required basic media courses. Since the instructional television course is an elective for students in the LS/ET masters program, some students simply couldn't fit it in their programs but still had a need and desire to know "something about videotaping." Others who intended to take the course had a need early in their programs to be able to do some simple videotaping.

Many other students from various departments and schools on campus take one of the basic media courses as an elective. These people often take only one course in our Division. If such students are to have any exposure at all to VTR, they must get this exposure in a basic media course.

Consequently we needed to develop an activity to provide an opportunity for students to handle videotape equipment; overcome their fear of using it; and actually engage in a small-scale production activity. Because we needed to cover so many topics in the basic media course, the activity could be no more than one, three-hour class period. Therefore, we set up a mini-VTR production exercise so that each member of the class could participate as a member of a group of four or five people.

Initially when I asked students to engage in the mini-VTR production exercise, I found that the groups lost considerable time trying to choose a topic for their productions. What often resulted



# Make Ziltsky

by Sigrid A. Trombley



was a five-minute videotape of purposeless conversation about some vague topic interspersed with long pauses when those talking could think of nothing to say or do.

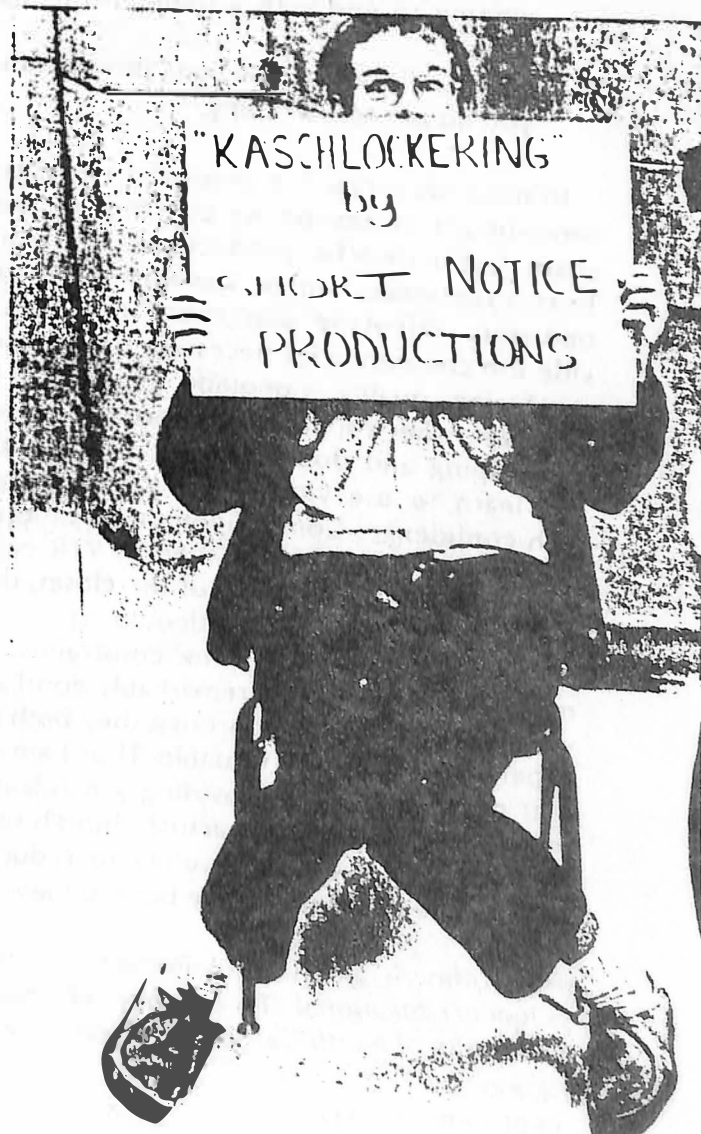
To save time and encourage better videotape productions, production tasks were assigned the next time students did mini-VTR productions. Each of the groups in the class was assigned one of the following tasks:

- 1) Your production company is to show us what the symptoms of "befshober" are and demonstrate the techniques for treating it.
  - 2) The job of your production company is to demonstrate the skill of "kaschlockering." You may decide what kaschlockering is and how it is done, but this skill may not be the same as a skill we already know.
  - 3) Your task as a production company is to demonstrate how "ziltsky" is made. You may decide what ziltsky is though it may not be something we already know by another name.
  - 4) Your production company is to teach us what the concepts "zof" and "jadker" mean and to teach us how to differentiate between the two concepts. You may decide what "zof" and "jadker" mean, but they may not be simply names for concepts we already know.
  - 5) Your production company is to demonstrate possible uses for a "podkalffir." You may decide what a podkalffir is, but it may not be another name for something we already know.
- By providing a production task, the initial time

loss in choosing a topic was eliminated. The non-sensical nature of the task forced the students to think creatively and produce videotapes which often reflected atypical and unique ways to visualize ideas.

Each group was provided with instructions for operating the videotape recorder, monitor, and camera. In addition, the following set of procedures and information was to be kept in mind when planning the production:

- 1) Limit your production to no longer than five minutes.
- 2) Create a content script based on the production task assigned to you. Since you will have a limited amount of time to plan your production, a verbatim script will not be possible. Instead, suggest main ideas you want to include and activities in which you will engage. Use any props you wish.
- 3) Create a camera script. Decide what will be shot when—close ups, medium shots, long shots, etc. Though you should attempt to include some variety in your shots, time will not allow you to develop and successfully execute a camera script which will involve many changes in camera distance, angle, and location.
- 4) Remember that television is a *visual* medium. Try to use the medium to its best advantage.
- 5) Decide what role each of you will have in the production—camera person, director, VTR operator, and “stars.”
- 6) Since a “blip” will occur on the television



screen every time you stop and start the VTR, plan to shoot your entire production from beginning to end with a minimum of starts and stops.

- 7) Make a "dry run" of your production before you do the actual taping.

In most instances, five groups of students in one, three-hour class session are able to plan, shoot, and share five mini-VTR productions. Of course this brief experience cannot develop competence in operating videotape equipment nor does it provide the competencies necessary for designing and producing quality videotape programs. It does, however, whet appetites for more experiences with videotaping and does convince students that they can learn to use videotape recording equipment with confidence. Consequently when these people do get in situations where there is VTR equipment, they are likely to get it out of the closet, dust it off, and try out their ideas for videotaping.

Amazingly, given the time constraints, the five-minute productions are remarkably good and often very funny. Students report that they both enjoy the experience and find it valuable. Thus I am confident that my objectives of providing a hands-on equipment experience with an actual, though small-scale, production and an opportunity to reduce anxiety in using the equipment have been achieved.

*The author is an Assistant Professor in the Library Science/Educational Technology Division of the University of North Carolina at Greensboro, 27412.*



## SELF EVALUATION

1. EIAJ refers to:
  - a. tape size
  - b. standardization of 1/2" tape
  - c. operating speed
  - d. channel designation
2. A unique feature of videotape is that it can be
  - a. processed in a couple of days
  - b. replayed immediately
  - c. spliced on the shiny side
3. Recording videotape requires the operator to
  - a. press record button only
  - b. press play button only
  - c. press record and play simultaneously
  - d. press play first then record
4. Which is not an input source for videotape recorder?
  - a. broadcast TV signals
  - b. television camera
  - c. slide projector
  - d. special effects generator
5. Which is the newest videotape medium?
  - a. 1/2" reel-to-reel
  - b. 1/2" cartridge
  - c. 3/4" cartridge
6. A television picture is composed of
  - a. 400 lines
  - b. 262 1/2 lines
  - c. 525 lines
  - d. 1000 lines
7. Which is not an advantage of videotape recording?
  - a. Immediacy
  - b. Inexpensive medium
  - c. Repeated recording possible
  - d. Feedback potential

1. b  
2. b  
3. c  
4. c  
5. b  
6. c  
7. b

ANSWERS:

## VIDEOTAPE RECORDING

### Assignment # 15

#### BEHAVIORAL OBJECTIVE:

Given a single camera VTR system (recorder, camera, monitor), the students in groups of 2 - 4 will record a 3 - 5 minute videotape on a topic of their choice.

#### Materials needed: (available in Room3)

Videotape or Videocassette Recorder

Monitor

Camera

Connecting Cables

#### Production Steps:

1. Plan production
2. Prepare visuals, including "credits" card
3. Connect components of system
4. Aim and focus camera
5. Operate VTR to record presentation
6. Rewind and replay, watching playback
7. Submit tape to instructor

----- (Cut here and attach to assignment when submitted) -----

#### EVALUATION:

Title of Program \_\_\_\_\_

Names \_\_\_\_\_

Scale Range

Criteria

Student

Instructor

0 - 5 Proper aim and focus

0 - 5 Program continuity

0 - 5 Participation by all students

#### Grading Scheme

14 - 15 = A

11 - 13 = B

9 - 10 = C



## PROGRAMMED INSTRUCTION

### Instructional Objectives:

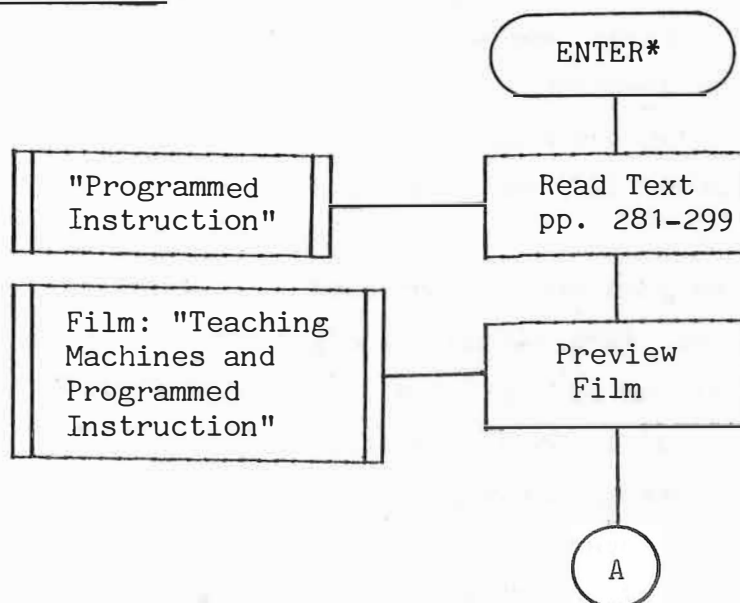
1. Complete the programmed instruction program "Programmed Instruction", filling in all response blanks and making sufficient correct choices to arrive at the end of the program.
2. Be able to state the fundamental differences between linear and branching programming techniques, identifying the names of the individuals responsible for developing and popularizing each.
3. Be able to name advantages of programmed instruction, stating the student types with which it is most successful.
4. Be able to explain and justify the use of programmed instruction with "slow learners" in light of the behavioral theory on which it is based.
5. Be able to employ evaluative criteria to select among alternative PI programs the best one for achieving a specific objective.
6. Be able to name three disadvantages of programmed instruction, stating the student type with which it is least successful.

### QUEST (Optional):

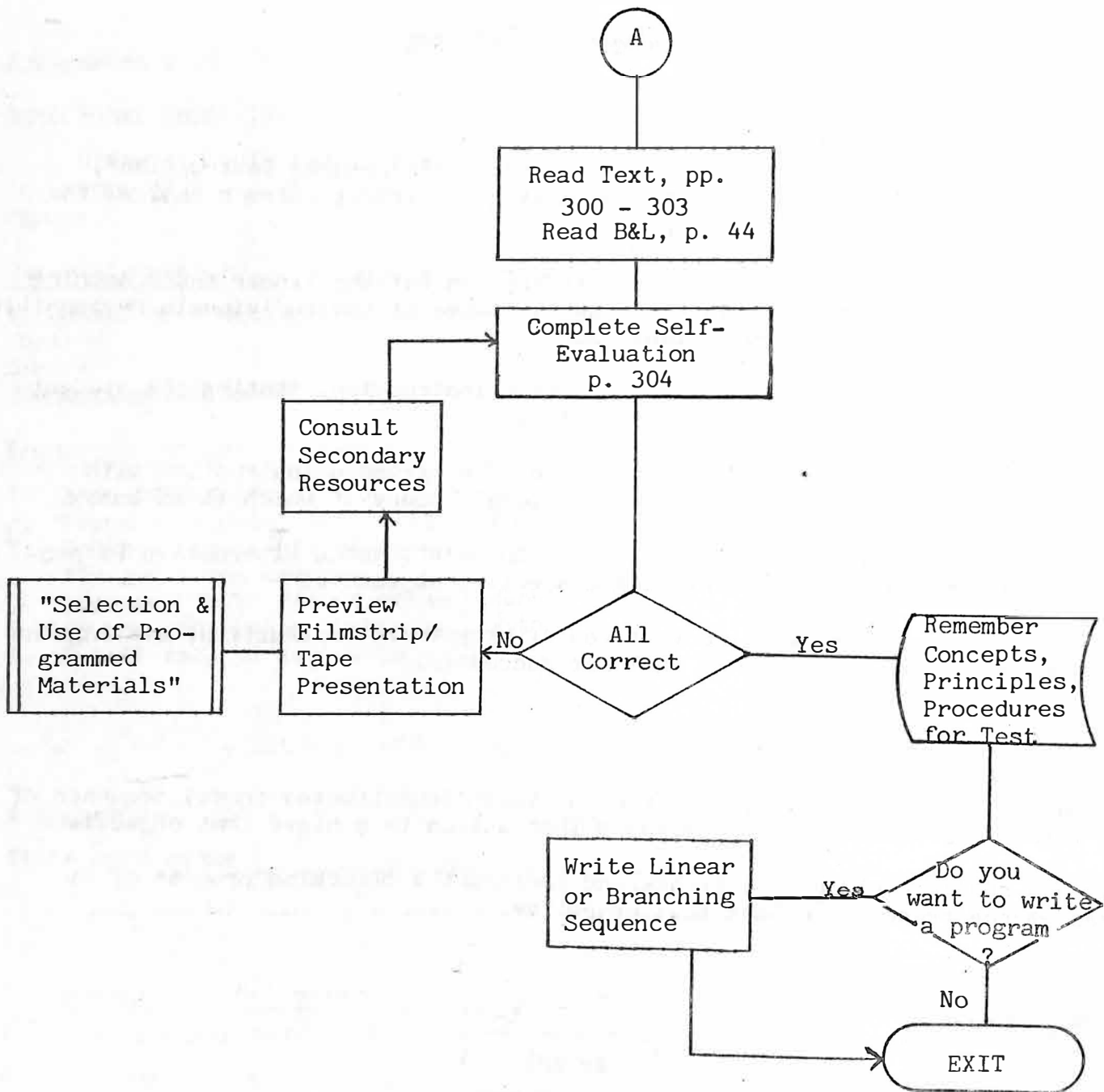
Given a specific objective, construct a linear (constructed frame) sequence of at least ten statements of programmed instruction to achieve that objective.

Given a specific objective, create and construct a branching program of at least three branches to meet that objective.

### Task Sequence:



\* Having read objectives



## Programmed Instruction

Programmed instruction evolved from the behavioral psychology movement represented by B. F. Skinner. Overt behavior, according to this theoretical position, is an innate and necessary part of learning; that is, necessary for learning to occur. His thinking was that if you presented very small, easily digestible bits of information so that anyone could learn it, require the learner to overtly associate the ideas presented (by writing it down), and reinforce that behavior, then the learner would be more apt to make the same response again.

Two aspects of behaviorism are particularly relevant to programmed instruction: associationism and reinforcement. The first assumes that the learning process is essentially mechanistic and that responses to particular stimuli are learned through numerous active trials, viz. practice. If you associate a stimulus and a response by practicing long enough, you will tend to remember that association better. Consequences that tend to cause repetition of associations are reinforcing. The learner will be reinforced or intrinsically rewarded by the success of completing an answer (association) correctly. Things that are reinforcing naturally motivate the student to do more, i.e., seek more reinforcement. Learning and behavior are synonymous according to this theory of instruction.

Programmed instruction is merely a technique or medium of instruction. While its underlying theory does not accurately reflect the nature of human learning, it has proven to be an effective instructional medium in many situations, especially with remedial students who haven't ever had the opportunity to establish a success cycle. For them, reinforcement can be motivating, too. Care and good judgment should be exercised. If we accept that performance or behavior is a product of learning and look at programming as a method for stimulating that product, it can become an effective extension of the teacher.

Programmed instruction assumes many different formats: programmed texts (such as the one beginning on the next page), worksheets, scramble books, filmstrips, television, and teaching machines form a simple roller mechanism to sophisticated simulators. Each of these formats represent a different presentation device. The programming aspects remain essentially the same. For this reason the text versions have generally been found to be as effective as any of the machines. Programming is a technique to shape learner behavior.

It may lead to learning but it cannot (like any other medium) be expected to assume the full load of instruction.

#### PROGRAMMED INSTRUCTION: A PROGRAM

This is a programmed instructional manual. Some of the information will be presented in frames. These are sequentially numbered. Instead of reading each frame down the page, each successive frame will be found on the next page, at approximately the same level along with the correct response for the previous frame. You are expected to WRITE in the answer in the space provided in each frame. Check yourself on the next page. On certain frames you will be requested to return to the page on which the initial frame was found and to continue with the frame below the initial one. When in doubt, look for the frame number. Other parts of the program require you to choose or select a response. That response will direct you to a specific page. When in doubt, follow directions.

TURN TO TOP OF NEXT PAGE

	<p>1. According to behavioral psychology, learning is a process in which some form of human behavior is changed. We say that learning results from a change in _____.</p>
8. behavior	<p>9. Skinner is a behavioral psychologist. He controls behavior by a process called _____.</p>
16. behavior	<p>17. If the teacher says "table" and the student replies "chair", we say that "table" is the _____ and chair is the _____.</p>
24. response, stimulus	<p>25. Teaching students to make correct responses may involve programmed instruction. Programmed instruction uses programs to change students' _____.</p>
32. stimulus	<p>33. If the stimulus information presented in a frame elicits the correct response, the response is rewarded or _____.</p>
40. more	<p>41. A successful programmer changes the probability that a particular _____ will be emitted on future occasions.</p>

1. behavior

2. Behavior is classified as any observable action. If a person changes his behavior in any way, he has \_\_\_\_\_ something.

9. conditioning

10. Any behavior is said to be a response to a stimulus. If a behaviorist presents a stimulus, he expects a \_\_\_\_\_.

17. stimulus,  
response

18. The problem " $2 + 2 = \underline{\quad} ?$ " acts as a stimulus to elicit the \_\_\_\_\_ of "4".

25. behavior

26. A program is a plan for learning. Because what you are learning is a planned, programmed sequence, it is a \_\_\_\_\_.

38. Skinner

39. Skinner uses \_\_\_\_\_ to motivate a learner to change his behavior.

41. response  
(behavior)

42. A program uses clues to lead the learner to make the correct \_\_\_\_\_ to the stimulus information presented in the frame.

2. learned	3. A change in behavior is manifested in some observable performance. In order for behavioral changes to be detected, they must be _____.
10. response	11. Conditioning is the process where presenting a _____ elicits a _____.
18. response	19. The task of teaching involves trying to increase the probability of a student making the same response to a particular _____.
26. program	27. A program consists of pieces of information called frames. For example, you have just finished reading the 27th _____ of this program.
34. reinforced	35. In a program frame, success is the _____ for a correct response.
42. response	43. With programmed instruction, the student knows immediately if his response is correct. This is called feedback. Student knowledge of response known as _____.

3. observable	4. Behavioral psychologists believe performance (behavior) and _____ are the same thing.
11. stimulus, response	12. In conditioning, a stimulus _____ a _____.
19. stimulus	20. A list of responses or things that the teacher wants the student to be able to do is called the terminal behavior. Terminal behaviors are a list of specific _____.
27. frame	28. The person who writes a program is called a programmer. A specification of terminal _____ is important to the programmer.
35. reinforcement (motivation)	36. By satisfying the learner's need for success, the program _____ specific S-R pairs.
43. feedback	44. A program is a sequence of _____ (planned/unplanned) frames that leads the student to change his behavior.



4. learning

5. The process of learning is the result of a \_\_\_\_\_ in behavior.

12. elicits,  
response

13. In the \_\_\_\_\_ process, a \_\_\_\_\_ elicits (leads to) a response.

20. responses

21. If a response is reinforced (i.e., a reward presented, it is more likely to occur after a \_\_\_\_\_ is presented.

28. behavior

29. A person who controls behavior by writing programs (programmed instruction) is called a \_\_\_\_\_.

36. reinforces

37. Programmed instruction uses reinforcement to motivate a learner to change his behavior. This process is called \_\_\_\_\_.

44. planned

45. A change in behavior results in \_\_\_\_\_.

5. change

6. Psychologists like B. F. Skinner try to control or elicit specific behavior to cause learning. Skinner is a \_\_\_\_\_.

13. conditioning, stimulus

14. The conditioning process is normally diagrammed like this: S-R. The "S" symbolized the \_\_\_\_\_; the "R" symbolizes the \_\_\_\_\_.

21. stimulus

22. A S--R pair that is reinforced is (more/less) likely to occur together.

29. programmer

30. A programmer writes a series of planned frames called a \_\_\_\_\_.

37. conditioning

38. Programmed instruction was devised by a behaviorist named \_\_\_\_\_, who conditions behavior.

45. learning

46. Programmed instruction is a technique that leads a learner through a series of steps called \_\_\_\_\_ toward a set of planned responses called \_\_\_\_\_ behavior.

6. Behaviorist

7. Behavioral psychologists affect learning by \_\_\_\_\_ behavior.

14. stimulus,  
response

15. In a teaching situation, the teacher's job is to get the student to make the correct \_\_\_\_\_ by presenting a certain \_\_\_\_\_.

22. more

23. When a reward is presented for making a certain response, that response is said to be \_\_\_\_\_.

30. program

31. A frame presents information to the student. It also requires the student to make a response. The student then advances to the next \_\_\_\_\_.

38. Skinner

39. Skinner uses \_\_\_\_\_ to motivate a learner to change his behavior.

46. frames,  
terminal

Now, turn to page 291.

7. changing  
(controlling)

8. According to behavioral psychologists, changes in behavior are accomplished by a process known as conditioning. Conditioning causes a change in \_\_\_\_\_.

(Return to page 283 for frame 9)

15. response,  
stimulus

16. The teacher is trying to change the student's \_\_\_\_\_.

(Return to page 283 for frame 17)

23. reinforced

24. Reinforcement increases the likelihood of a particular \_\_\_\_\_ following a certain \_\_\_\_\_.

(Return to page 283 for frame 25)

31. frame

32. The information presented in a frame of programmed instruction that elicits a response is called the \_\_\_\_\_.

(Return to page 283 for frame 33)

39. reinforcement

40. If a student makes a response and is told that it is correct, the student will be \_\_\_\_\_  
(more/less)  
likely to repeat that response if the same stimulus were presented.

(Return to page 283 for frame 41)

TURN TO NEXT PAGE

Different programming techniques are used to lead the student to the desired goal behavior. The preceeding frames are response centered. They are comprised predominantly of stimulus information that is designed to elicit a specific response, designed on the basis of behavioral principles espoused by Skinner and others. This linear (extrinsic) programming design is most prominently used, though, it can be boring and ineffective if not constructed properly.

Another type of program construction that Norman Crowder has popularized is called corrective, branching or intrinsic programming, where a student takes a route through the program that is determined by his own response to each question. It is a stimulus centered program.

Answer the following question by choosing a response and turning to the page directed by that response.

The type of program that offers the student a choice in the response elicited by the information is a

linear program

TURN TO PAGE - 292

branching program

TURN TO PAGE 294

No, you weren't reading carefully. A linear (framed sequence) program has only one correct answer that is elicited by the stimulus. The programmer designed the stimulus information to lead to only one answer.

Now, return to page 291 and reread the passage.

A branching program presents more information to the student than is presented in a linear program. It then requires the student to select from alternative responses. The student, upon responding, is also immediately informed about the correctness of his response. If the choice is incorrect, remedial information is presented to the student. In a linear program, if the student makes an incorrect response, no attempt is made to inform the student what the correct response is. In a branching program, a student can proceed directly through the program if the presented information is comprehensible. If problems are encountered at any given point, explicative and remedial information is presented, after which the student is reinserted into the correct stream of the program.

Branching programming is based on which psychological approach?

Behavioral

TURN TO PAGE 295

Linguistic

TURN TO PAGE 296

You're absolutely correct. A branching program presents information to the learner, as on page 291 , and asks a question about that information, requiring the student to select from two or more alternative answers and complete an action, as you have done in turning to this page.

A linear program is comprised of a certain amount of stimulus information that should elicit one and only one specific predetermined response. That's why it is response-centered. Branching programs are said to be stimulus-centered; that is, understanding of the stimulus information is necessary before progressing.

TURN TO PAGE 293



No, I'm afraid you're wrong. The Skinnerian linear programs are a manifestation of behavioral psychology. Each frame consists of an S-R pair with the eminent success providing the reinforcement for the association of the stimulus and response. According to behavioral learning theory, these are the only conditions necessary for learning to occur.

Return to page 293 , reread it and try the answer again.

Good guess. Though the term "linguistics" has not previously been presented in the program, you were able to determine that branching programming is based on linguistic or verbal tactics. Branching programs depend on comprehension of verbal messages. Human learning, according to Crowder, involves more complex linguistic agencies than the simple S-R pair. They are stimulus-centered because the linguistic (stimulus) message is of primary importance. An incorrect response (turning to the wrong page) is corrected by the presentation of more verbal stimuli.

NOW TURN TO PAGE 297

Programmed instruction is often associated with sophisticated and expensive teaching machines. These instruments are not necessary for construction and implementation of programs. With a limited amount of instruction and a ditto machine, teachers can easily create programs to meet specific educational needs.

The most interesting programs employ various construction techniques. Linear frames should be combined with branches. Entries for books to teach you how to program information are found on pages 305-306 of this program.

Many publishers produce a wide variety of programmed materials in text form for use in the classrooms, as well as programs for use with teaching machines or even computers (Computer-Assisted Instruction) if budget allows. If you'd like to try programmed instruction in your teaching and want a complete listing of programs available, consult the Hendershot book listed on page 305 . Bibliographic entries for additional texts about the construction and utilization of programs appear on page 305 .

I am interested in using programmed instruction in my teaching.

TURN TO PAGE 298

I am still not sure what programmed instruction is or how it is used.

TURN TO PAGE 283

To recapitulate some of the concepts of this program, mark with an "A" the items in the following list that you consider to be an advantage of Programmed Instruction, and use a "D" for the disadvantages.

- \_\_\_\_\_ Student follows a logical sequence of thought.
- \_\_\_\_\_ Emphasizes only content, avoids affective goals.
- \_\_\_\_\_ Immediate feedback from response.
- \_\_\_\_\_ Tendency to be boring, especially to brighter students.
- \_\_\_\_\_ Well suited to many learning tasks.
- \_\_\_\_\_ Wide variety of media used in presenting stimuli.
- \_\_\_\_\_ Difficult to validate and field test.
- \_\_\_\_\_ Allows self pacing, student learns at his own rate.
- \_\_\_\_\_ Student responds overtly to each presentation.
- \_\_\_\_\_ Uses reinforcement rather than punishment to motivate performance.

---

This is called a discrimination frame. They provide an opportunity for the student to make multiple responses. Now, check the correctness of your responses.

TURN TO NEXT PAGE

- A   Student follows a logical sequence of thought.
- D   Emphasizes only content; avoids affective goals.
- A   Immediate feedback from a response.
- D   Tendency to be boring, especially to brighter students.
- A   Well suited to individualized learning situations.
- A   Wide variety of media used in presenting stimuli.
- D   Difficult to validate and field test.
- A   Allows self pacing, student learns at own rate.
- A   Student responds overtly to each presentation.
- A   Uses reinforcement rather than punishment to motivate performance.

THE END

### Characteristics of Programmed Instruction:

1. It is a form of communication, a method for structuring and presenting information, not necessarily employing the use of machines (more frequently does not).
2. Predetermines desired student response to improve predictability of results.
3. Linear Programs (Figure 1):
  - a. Content is broken down into small steps.
  - b. Steps are sequenced or otherwise structured for maximal learning.
  - c. Individualized - student works independently at his/her own rate.
  - d. Each student responds to each and every frame.
  - e. Immediate feedback (knowledge of results) is almost always positive because of small step sizes and simple associations. This feedback becomes reinforcement.
  - f. Response-oriented, i.e., learning is said to result from overt behavioral responses.

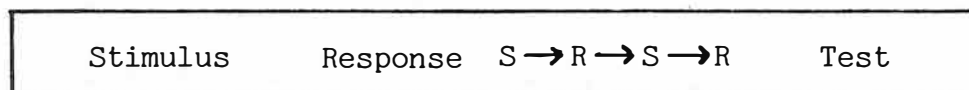


Figure 1. LINEAR PROGRAM CONFIGURATION

4. Branching Programs (Figure 2):
  - a. Programs not linear; the individual student determines the "route through" the program based upon his/her understanding of the material.

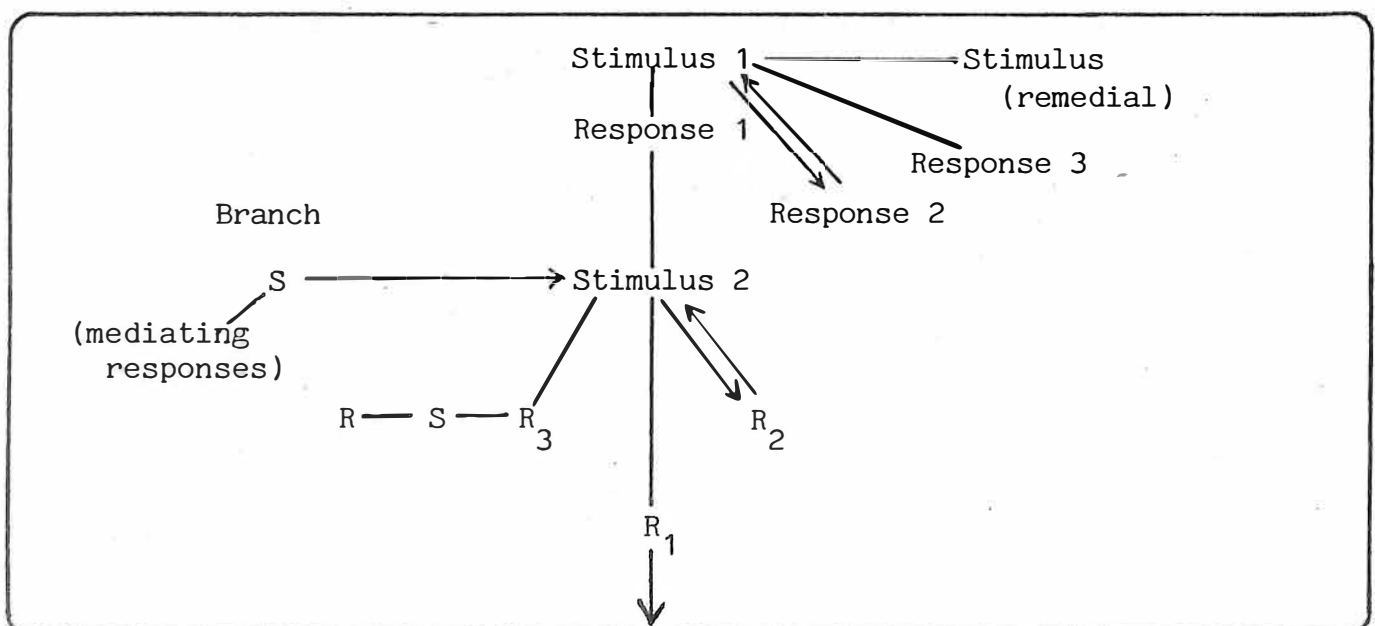


Figure 2. BRANCHING PROGRAM CONFIGURATION

- b. Step sizes are considerably longer. Several paragraphs may be combined prior to eliciting any response.
- c. Stimulus-oriented program, i.e., focus is on the presentation stimulus material.
- d. Learning is seen as realignment of the individual's cognitive structures.
- e. Students are asked to "think through" the frame to understand where the program is going. This understanding makes this a more holistic learning device.
- f. Student not always correct in responding. A remedial or informational branch is usually written in to correct the misconception and "get the student back on track."
- g. Avoidance of branches, resulting from the correct response, leads to the shortest route through the material.

#### Advantages of Programmed Instruction:

1. Students actively participate in learning.
2. Individualized pacing.
3. Feedback and reinforcement generally increase motivation to learn.
4. Materials are flexible: may be supplementary, or for primary instruction, for partial or complete courses.
5. Especially effective for slow learners; creates a success cycle.
6. More efficient method of instruction - usually decreases amount of time needed to learn a given quantity of material.
7. Improves learning when used as instructional supplement to normal instructional procedures.

#### Disadvantages:

1. Mechanistic, repetitious.
2. May tend to be boring for bright students.
3. Immediate feedback may not be reinforcing to all subjects.

## Principles of Utilization:

1. Using selection tools, such as ENTELEK's Programmed Instruction Guide or Bibliography of Programs and Presentation Devices by Hendershot (available in Center for Instructional Media), select appropriate-sounding programs.
2. Look for evidence of field testing or validation.
3. When none is available, you should definitely inspect the program for content validity and potential effectiveness before using.
4. When evaluating a program, use this checklist developed by James D. Russell for a course at Purdue University:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
<u>Objectives</u>					
Is the program accompanied by a list of objectives stated in specific behavioral terms (i.e., student performance)	___	___	Does the post-test measure the student's comprehension of the content of the program?	___	___
<u>Instructions</u>			<u>Confirmation</u>		
Does the program have a self-contained set of instructions on how to use it?	___	___	Are the confirmations presented in such a way that they are not easily exposed accidentally?	___	___
<u>Information</u>			Are the confirmations accurate and clear to the student?	___	___
Is an overview of the material provided?	___	___	Is the student given freedom to deviate from the given confirmation by the indication that an equivalent response or a different order of items is acceptable?	___	___
Is the information accurate and up-to-date?	___	___	Are helpful remedial comments provided when wrong or alternative answers are anticipated?	___	___
Is the reading level suitable for the intended population?	___	___	Do the instructions allow the learner to skip unnecessary repetition and to return to previous material when necessary?	___	___
Are technical terms and symbols adequately defined?	___	___			
Does the content cover the stated objectives, yet is the program "lean" (without superfluous and redundant material)?	___	___			
Do the frames contain only critical verbiage (i.e., information needed to respond to the questions)?	___	___			
Does the program periodically review what has been taught?	___	___			



	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
<u>Questions</u>					
Are the questions related to the objectives of the program?	___	___	Are enough questions used to allow the learner to apply the information to a variety of situations?	___	___
Do the questions have a wide variety of formats (fill-in, multiple-choice, matching, direct questions, drawing figures, etc.) to accomplish different purposes and to maintain student interest?	___	___	<u>Criterion Frames</u>		
Is the type of question used appropriate to the purpose of the frame (matched to actual performance conditions)?	___	___	Are the criterion frames readily recognizable and relevant to the stated objectives of the program?	___	___
Do the questions require the learner to use all the critical (most important) information in the frame?	___	___	<u>Media</u>		
Do the questions require the learner to "understand" or apply the information presented in the frame rather than merely analyzing the cues and prompts or copying some words from the information?	___	___	If media is used is it relevant to the program?	___	___
Do the questions avoid asking the student to recall information presented in a previous frame but NOT "established" (i.e., not used by the student when responding to the question in the previous frame)?	___	___	Does the program use media (visuals, audio-tape, or actual materials) when and where appropriate?	___	___
			<u>Validation Data</u>		
			Is the program accompanied with validation data including:		
			a. target population (entry behavior)	___	___
			b. instructional situation	___	___
			c. time taken to complete program (median & range)	___	___
			d. gain in student achievement	___	___
			e. change in attitude	___	___
			i. toward subject matter?	___	___
			ii. toward programmed instruction?	___	___
			FROM: Russell, J.D. "Evaluation and Selection of Programmed Materials" (mimeographed). Lafayette, IN: Purdue Univ.		

5. Relate all evaluation to your own instructional objectives, i.e., will it help facilitate their achievement.
6. Use either linear programs for slower learning students and branching programs for more mentally capable students.
7. Instruct the students to fill in blanks, i.e., respond overtly. Otherwise, they may read through the material as a normal text, deriving few if any of the advantages of programming.

## Self-Evaluation

1. Linear programming is based on which rationale?
  - a. stimulus-centered
  - b. response-centered
  - c. learner-oriented
2. Which is not a characteristic of branching program?
  - a. stimulus-centered
  - b. student determines next frame
  - c. small steps
  - d. non-linear
3. Which is not a general characteristic of Programmed Instruction?
  - a. intrinsic reinforcement
  - b. group-paced learning
  - c. periodic review sections
  - d. immediate feedback
4. Programmed instruction is most effective with
  - a. slow learners
  - b. accelerated learners
  - c. mentally retarded
  - d. "A" students
5. Immediate feedback provides in programs:
  - a. review
  - b. reinforcement
  - c. knowledge of results
  - d. recapitulation

ANSWERS  
1. b  
2. d  
3. c  
4. b  
5. d

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## COMPUTER BASED INSTRUCTION

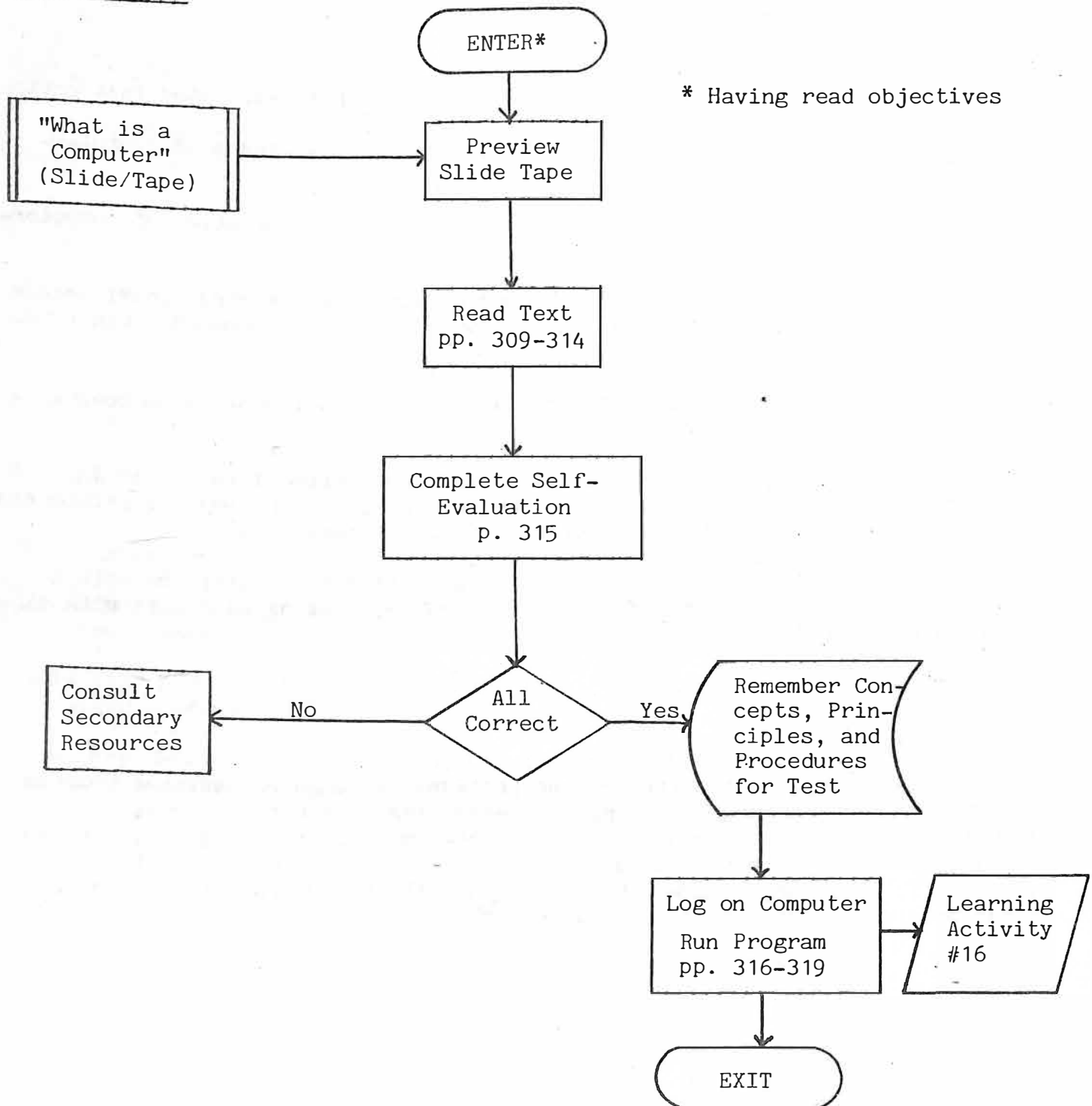
### Behavioral Objectives:

1. Be able to list and describe the six modes of computer-assisted instruction.
2. Be able to list at least three advantages and disadvantages of computer-assisted instruction.
3. Be able to identify at least three fundamental characteristics of computer-assisted instruction.
4. Given a computer terminal, account number, and a self-instructional programmed list of instructions, log on (interact with the computer via time-sharing system).
5. Given an appropriate code name, call an instructional program on computer-assisted instruction, completing it at your own pace.
6. Given proper instructions in the same self-instructional format as #4, sign off the computer, terminating the interaction. The log-off information will be submitted to the instructor as proof of completion.
7. Given a set of appropriate blocks on an unlabeled flow chart, be able to correctly label the parts of a computer system, linking each part with lines drawn between the blocks.

### QUEST (Optional):

Log on and complete the first three sections of computer-assisted program on BASIC computer language. Having completed this instruction, construct a BASIC instructional program of at least 15 statements, including at least one branch (IF - GO TO). After inspection by instructor or a member of the computer staff, enter the program and run it, submitting the run with a listing of the program as proof of completion of the task.

Task Sequence:



## Computer Based Instruction

The application of computers to instructional problems is a relatively recent phenomenon. Adapting a machine that was originally designed solely for "number crunching" as a medium of communication has been difficult. Most implementation has resulted from technological developments, particularly the development of time-sharing systems and portable terminals. It was not feasible for each school or classroom to purchase their own computer (the recent development of micro-processors or micro-computers has changed this reality), but the availability of computer services provided by a sharing arrangement made it possible. Also, input-output devices are now more appropriate for instructional purposes (portable, with visual displays). Finally, it took educators a while to realize the implications of computers for instruction. While still in its infancy, CAI is growing rapidly, especially in combination with other media, such as television. Its implications for information storage and retrieval are phenomenal. Their consideration, however, is not in the domain of this course. Unsuccessful adaptation occurred because it was not initially known what characteristics of computer processing were particularly adaptable to instruction. Major funded projects in the sixties and seventies have explored computer-assisted instruction in major cities around the country, frequently without significant results. It has all too frequently functioned as an expensive and sophisticated mechanism for drill and practice. Lawrence Stolurow briefly describes these and other more important application of computers to instruction.

### Characteristics of CAI:

#### WHAT IS COMPUTER-ASSISTED INSTRUCTION?

L. M. Stolurow

Computer-assisted instruction (CAI) is not the panacea for today's educational problems. There is no single solution to problems as complex as these.

Computer-assisted instruction is a substantial innovation in, and for, education. An analysis of CAI as a concept, as contrasted with an analysis of existing systems, suggests that it has the potential for making at least

one order of magnitude change in the educational process.

The unique character of a CAI system depends on the ability of the computer to provide two significant capabilities: memory and logic. No other aid provides the detailed collated memory of students' responses to individual displays of instructional materials in a form that is directly useful for automatic processing. Nor does any other aid provide its logical capability for making the organization of instructional information dependent upon the characteristics of the individual.

These features can best be seen in terms of the six major "modes" of use in CAI instruction.

### Problem Solving

One of the CAI system modes is problem solving. This mode is readily achieved, provided the typical computational capability of the computer is available and there is a typewriter or some other display and response device, usually remote, in two-way communication with it. Each student must know a language that permits him to enter into the system both the data for his problem and the steps which the computer must take to work out the solution.

The student needs to know how to communicate with the computer and how to solve his problem.

The professor may teach in the same way he has taught in the past. He need not become involved with the CAI system unless he particularly wants to.

### Drill and Practice

The second of the CAI system modes is drill and practice. In order for the student to use the CAI system in this mode, the system must be programmed to handle the particular drill and practice materials selected, or developed, by a teacher. The materials are designed to build skills and give the students the kinds of practice that the teacher feels they need to meet the minimal objectives of his course. Consequently, the drill and practice mode involves the instructional staff in the use of the computer to a much greater extent than does the problem solving mode. The student, though involved rather intensively in the use of the console, nevertheless needs to know very little about the way in which the CAI system works, since he uses his natural language, not a computer language, in order to get his job done.

### Inquiry

The inquiry mode is the third type of CAI application. In this mode the CAI system responds to the student inquiry with answers it has stored in its files to the extent that the algorithms it contains provide access to that information. In this mode, the student does not need to know much about the CAI system, but the instructional staff must learn how the system operates in order to establish files and search algorithms that anticipate student questions.



## Simulation and Gaming

A fourth mode of CAI is simulation and gaming. In this mode the instructional staff formulates a model of some real or idealized complex situation. The complex relationships among the variables that represent the situation are the aspects of the situation that the student must learn to work with and interpret. A game may not represent a particular business or interpersonal interaction.

A simulation, on the other hand, does attempt to represent a real situation. To implement this mode of CAI the teacher must define the model sufficiently to permit it to be programmed. A computer program must be written to process the student's input so that he gets a meaningful output. The output is determined by what the student does and by the model. The student interacts by using natural language.

## Tutorial Instruction

A fifth mode of CAI is tutorial instruction. In this mode the instructional staff takes responsibility for the student's instruction on the system. The logic of the instruction must be formalized and entered into the system.

The important factor here is the responsibility assumed by a teacher for the kinds of interactions which occur during the instructional experience. The specific instructional logic to be used for a particular student will be one that is generated by the system, based upon information it contains about the student and about the factors that make a difference in his instruction.

The tutorial mode is not only Socratic in its dialogue with the student but it is also managerial in its use of each of the other modes as needed. In designing instruction for this mode, the instructor must become familiar with a computer language in order to develop the conditions for tutorial instruction. He must also formalize his philosophy of teaching and the specific strategies he wants to use at each stage of the instructional sequence.

Two families of strategies are used. In one, the set of possible conditionals is specified sequentially as data are accumulated. In the other, all conditionals are specified in advance of instruction for all learners. The actual programming or coding of the material need not be done by the author, but he needs to be able to communicate what it is he wants done to someone who has these skills.

Computers when used for teaching can provide supporting activities to teachers as well as to students. Many high-level computer languages provide the author with the means for entering and editing course materials.

## Author Mode

An additional capability not now available in any substantial way can be called the author mode of CAI.

In the author mode, a CAI system is used to support instruction by generating sets of materials for a student's use. In order to build a system with this capability, instructors must identify the primitives of their instructional materials and the algorithms that can be used to generate the desired text for student use.

The primitives vary with the nature of the instructional materials. For example, in generating concept learning materials for students, there might be sentence forms which have blanks in them, each of which is to be filled by a word or set of words that is inserted into the blanks by the computer according to a set of instructions. Different words must be inserted in a particular blank at different meanings. In effect, in the author mode, the computer is used as a compiler of educational text.

#### Advantages of CAI

The main advantages of a CAI system are related to the degree to which it permits the individualization of education and, particularly, instruction. It is important to distinguish between individualization of means and individualization of ends.

More specifically, the kinds of advantages to be gained from a CAI system include: (1) the capability of individualizing both the means and the ends of instruction; (2) the capability of doing research on teaching under controlled conditions and, in particular, under conditions which individualize instruction in a particular way; (3) the capability of doing research on various modes of teaching, with the ability to collect detailed records of student performance permitting evaluation of the effectiveness of the teaching procedures, as well as the effectiveness of the materials; (4) the capability of developing ways of assisting teachers and authors in the development of instructional materials; and (5) the capability of evaluating alternative media used to implement and support instruction, e.g., slides, audio tapes, films, CRT displays, typewriters, light pen, touch plates, sketch pads, etc.

#### Implementation of CAI

There are three basic problems involved in the creation of any CAI facility, whether it is to be located in an elementary or secondary school, an institution of higher education or an industrial plant. One is the development of computer software; a second is the development of educational software; and the third is the selection of teaching strategies appropriate to the particular application being considered.

### Advantages of CAI:

1. Through participation, students actively respond to stimulus material.
2. Immediate feedback and remediation (slight system delays occasionally occur).
3. Individualized:
  - a. student paces himself/herself
  - b. computer interacts individually, adapting to each student through the program structure, which provides an infinite number of branching possibilities
4. Computer also frequently provides a recording-keeping of student performance. This is in the domain of computer managed instruction, especially when, based upon the records kept, the computer makes instructional prescriptions.
5. Potential for simulating environmental problems makes CAI an exciting medium of instruction. This is a result of the capacious memory and high speed processing of a multifaceted array of variables that might simulate reality.
6. Can accomodate a large number of students simultaneously (through time-sharing).
7. Geographically unlimited: with portable brief-case terminals, you can interact with a computer anywhere there is a phone.
8. Reduced error in instruction.

### Disadvantages:

1. Lack of commercially available software (instructional programs) available. Programs are constantly being developed, though.
2. Adaptability of existing programs to various computer systems because of programming language differences, system capabilities, etc.
3. Cost: While projects such as PLATO IV have student hook-up time (while interactive) down to a minimum, alternative systems are still comparatively expensive.
4. Limited applications: To date, most CAI programs have simply been drill procedures or unsophisticated branching programs (see unit on Programmed Instruction). New applications for simulation augur the potential of computers for instruction.
5. Complexity, cost, and difficulty of locally programming instruction for the computer. The language skills and time required to do adequate instructional programming are frequently prohibitive; however, simple author languages, such as COURSEWRITER, are alleviating this problem.
6. Possible dehumanizing effects on the students resulting from a lack of rapport with a human teacher (an issue on which opinions are polar and adamant).

### Principles of Utilization:

1. Use drill and practice programs only to supplement primary instruction on algorithms being practiced.
2. Don't use CAI as a baby-sitter or time-filler. Students will adopt a similar opinion of the medium, thereby reducing its efficiency.
3. The rules and pay-offs implicit in computer simulations need to be thoroughly explained prior to beginning.
4. Modes of CAI are best prescribed individually. Setting a class down to terminals to work on the same program at the same time is not an appropriate application.

## SELF-EVALUATION

1. Computer-assisted instruction is most like
  - a. perceptual learning
  - b. transfer of training
  - c. programmed instruction
  - d. computer-managed instruction
2. Supplementary seat work in remedial math problems would be an example of which mode of computer-assisted instruction?
  - a. problem solving
  - b. drill and practice
  - c. simulation and gaming
  - d. inquiry
3. The machine that converts programming language into computer language is
  - a. data bank
  - b. terminal
  - c. CRT
  - d. compiler
4. Which mode of CAI is most realistic or "life-like"?
  - a. tutorial
  - b. simulation and gaming
  - c. inquiry
  - d. author
5. Which is not an advantage of CAI?
  - a. immediate feedback
  - b. software availability
  - c. student paced
  - d. record-keeping ability

ANSWERS:  
1. c  
2. b  
3. d  
4. b  
5. d

## The Layperson's Guide to Happy Hunting on the Hewlett Packard

These instructions will help you sign on the Hewlett Packard 2000F from the teletype in the Self-Instruction Lab.

1. Make sure the power for the modem is switched on. The modem is the light green telephone cradle-like device sitting next to the beige-colored teletype.
2. Using the telephone, call your friendly computer. Its number is 5523. The phone will ring and (if the computer is "up", i.e. working) you will hear a high pitched singing tone.
3. Place the phone in the modem making sure the end of the phone where the cord is attached, is at the top.
4. Turn the dial on the front of the teletype to LINE.
5. Look at the teletype keyboard and execute the following:

Press the key labeled



Type a slash, a figure 5, and another slash. (Note: the slash key looks like this



The 5 key looks like this



,

Now again press the RETURN key and the key labeled



(If nothing is typed on the yellow paper when you type /5/, you have probably lost your phone connection. Hang up, pick up the phone again and repeat Step 2)

6. The computer will respond with this typed message PLEASE LOG IN.
7. Now type the password (see Photo Essay in front of Terminal, since it changes periodically).

Press the RETURN key (Remember, the computer never knows what you've said until you press RETURN.)

(Note that there are no internal spaces in commands to the computer. If you accidentally include a space in the above command or make any other error, the computer will not let you log on.)

8. The computer should respond by typing the following:

```
TUCC HP 2000/ACCESS SYSTEM
date time    PORT #25
READY
```

If it doesn't give you this message, repeat Step 7.

9. You've probably noticed that the computer has been typing double letters. e.g.,


HHEELLOO--,GGAAMMEE

To get rid of this annoyance, type the following letters:

ECHO-OFF (press RETURN key)

10. Now you are ready to proceed. Type in:

GET-\$name (Hit RETURN key)

In the above, name refers to the name of one of the programs. E.g. \$ABAGEL, \$GHETTO, \$GOLF, etc. Remember, that it's necessary to type the dollar sign as well as the name of the game. The dollar sign is on this key . You must press the button labeled SHIFT as you press the dollar sign key.

11. The computer should advance the line feed. Now type the letters

RUN (press RETURN key)

and the program will start.

12. If you want a program to stop, hold down the BREAK key while the program is running. The computer will say "Stop", and you can start a new program.
13. To quit, just type the letters "BYE", hit the RETURN key, hang up and turn off the teletype and the modem.

#### HELPFUL HINTS

- A. If, when you call the computer you don't hear the high pitched tone, the computer isn't working. Don't get mad! Do come back later and try again.
- B. Anytime you are trying to type something and what you type doesn't appear on the yellow sheet, you've probably lost your computer connection. You need to go back to instruction #2.
- C. If you are typing something in and see that you've made a mistake before you hit RETURN, hold down the key labeled CTRL (stands for CONTROL) while you also press the key for the letter X. Then press RETURN.

## BEHAVIORAL OBJECTIVE

Given a computer terminal and instructions for operating it, the student will log on, interact with at least one of each of the following types of programs and sign off. Types of programs: games or "fun" activities, tutorial program, simulation.

Some names for programs that are fun or interesting or what have you are:

- 1) \$FLASH            tests reading and spelling ability.
- 2) \$VOCAB            vocabulary drill on word meanings.
- 3) \$BLJACK           plays blackjack, also known as 21.
- 4) \$TUTO1            the next to the last character is zero, not the letter O. Please note, too, that the figure one (1) and the letter L (l) are represented by different keys. A program which teaches computer programming in the BASIC language.
- 5) \$DRILL            drill in addition, subtraction, multiplication and division.
- 6) \$MADLIB            writes stories. Try it.
- 7) \$TRAP             a number guessing game.
- 8) \$LETTER            an alphabet guessing game.
- 9) \$JULIAN            produces calendars.
- 10) \$TENS             timed multiplication drill.
- 11) \$ALGIE            drill in basic algebra.
- 12) \$PREFIX           teaches English prefixes.
- 13) \$ZOT              a zany game.
- 14) \$ROULET           try your luck - but save printout of directions for later use - they are long.
- 15) \$STTR1            Star Trek fans, this is for you. You are Captain Kirk and must clobber Klingons to save the known universe. Save the directions for later use - they are very long. Very complex and difficult game. Try it only if you have some time.
- 16) \$CAVES1           find your way out of these caves. Three levels of difficulty.
- 17) \$CAVES2           like \$CAVES 1, but you set up the caves for a friend to solve.



COMPUTER PRINT OUT (continued)

- 18) \$WORD a scrambled word appears and you must unscramble it before your time runs out.
- 19) \$GOLF How's your putting? And why are you always in one of the traps?
- 20) \$ABAGEL computer thinks up 3-letter words which you must guess.
- 21) \$BIOSIN Are you guided by your biorhythm? Chart your life's physical sensitive and cognitive cycles.
- 22) \$CHOMP the board is a big cookie, but 1 square is poison. Any number can chomp.
- 23) \$HURKLE the Hurkle is a happy beast. Find him if you can.
- 24) \$GHETTO a simulation of ghetto life. Be careful if you hustle; you might get busted!
- 25) \$OREGON back to the adventurous days of yesteryear as you take a simulated trip along the Oregon Trail. Watch it now- don't get ambushed. Oh yeah, and don't forget your hiking boots.

There is much, much more. See the H-P (Hewlett-Packard) library and the book called What Do You Do After You Hit Return? (computer bookshelf in CIM or in Dr. Hines' office.)

- - - - (Cut here and attach to assignment when submitted) - - - -

COMPUTER PRINT OUT

EVALUATION:

Name \_\_\_\_\_

Simply sign your name to the print-out and circle the names of the programs with which you interacted, and hand in. You will receive credit for completing the assignment.

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NJ: Hayden, 1970.

Spencer, Donald. The Story of Computers. Ormond Beach, FL: ABACUS, 1975.

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#### COMPUTER PROGRAMS

NNBAS\$\*\*\*. Twenty lesson course in BASIC programming. Bethesda, MD: General  
Electric Company. (3-4 hours completion time)

Dwyer, Carol. ESSAY. Demonstration program in COURSEWRITER II. University  
Park, PA: CAI Lab, Penn State University. (1 hour completion time)

Arsenault, Gilliam. How to Use CAI. Demonstration program in COURSEWRITER III.  
Burnaby, B.C.: Simon Fraser University.

#### ADDITIONAL MEDIA

"Computer Assisted Instruction." Filmstrip, color with reel or cassette tape.  
Ellensburg, WA: Educational Media, Inc., 1969.

"Sign On/Sign Off." Film, 16 mm, color, sound, State College, PA: Pennsyl-  
vania State University, 1967.

#### NOTE

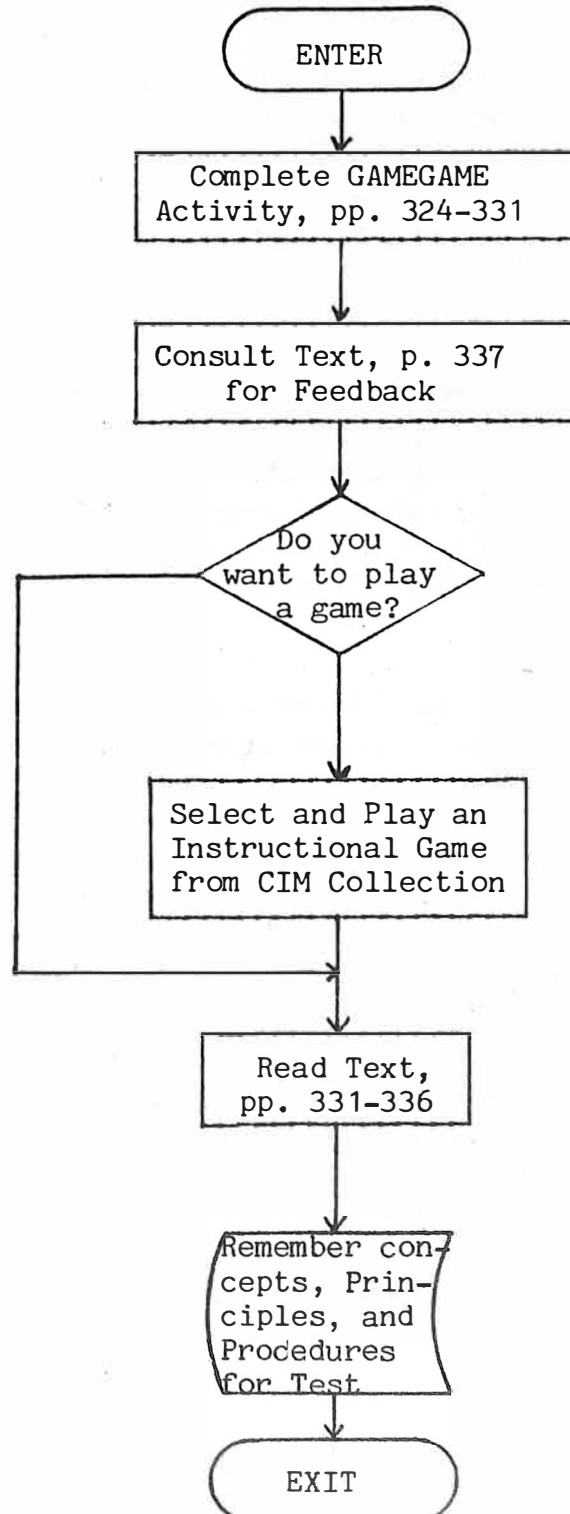
This module does not represent an in-depth treatment of computer-assisted instruction. A more intensive survey, while interesting, is beyond the scope of this course. It is recommended that interested students also pursue the concept of Computer-Managed Instruction, which uses the computer to maintain cumulative student performance records on all phases of their instruction, diagnose student problems, and make instructional prescriptions all based on pre-programmed contingencies. Eliminating such chores would free teachers to engage in more creative and meaningful tutorial interactions with students. There is no doubt its future is expansive.

## GAMES AND SIMULATION

### Instructional Objectives:

1. Be able to distinguish between simulation and games.
2. Be able to design and construct an instructional game on a topic of your choice. The design should include objectives, target audience, and instructions. The game should include some sort of board or chart (laminated, lettered, etc.).

### Task Sequence:



GAMEGAME II  
by  
Sivasailam Thiagarajan

Everyone's talking about instructional simulations and games and most of them are using the terms inaccurately. This is all very confusing and people are tempted to extrapolate from apples to oranges. To eliminate the confusion, many scholars have analyzed, defined, and explained the concepts of instruction, simulation, and games. But obviously what is needed in addition is a fast motivating method for providing people with practice in making discriminations among simulation games, nonsimulation games, nongame simulations, instructional games, noninstructional games, instructional simulation games, etc. GAMEGAME II attempts to do exactly that.

Definition Diagram

Figure 1 , on page 326, summarizes the critical attributes of different concepts. You should study the diagram beforehand to get ready for the game; you may use it as a reference during the game. Hopefully, after the first few rounds you will become such an expert that you will be able to discard the diagram entirely.

Item Descriptions

Twenty-two different popular items similar to the example below will be described in the game. These items represent all seven categories of the definition diagram, but they are neither labeled nor arranged in any order. Although a description may contain the terms "instructional," "simulation," and/or "game," your job is to classify it objectively on the basis of your own discriminations.

How to Use the Definition Diagram

Read the description of the item carefully and figure out to which circles it belongs. Notice that it has to have all three attributes to belong to the **game** circle. If the item belongs to only one circle, then classify it with the label for the circle. If it belongs to two circles, use the label from the overlapping area of both circles. If it belongs to all three circles, use the ISG label from the central intersection.

### Sample item description:

SWINDLE! Competitive individual play calls for strategic thinking, some role playing, unofficial bargaining, decision making, and comparative shopping. Players begin with equal resources and compete for highest score, based on how money was spent, and whether gyps and frauds were avoided. The unique quality of SWINDLE! is of course, its subject matter: while other games do help players learn proper budget control, this is the only one which tries to warn them about the traps waiting out there for those with dollars and a bemused grin.

During the play of the game you should use the maximum-attribute category. For example, SWINDLE! is an instructional simulation game (ISG). It is also a game (G), a simulation (S), and an instructional material. However, if you classified it as just G, S, or an I you wouldn't score any points.

### Expert Classification

As part of the scoring system, you will be comparing your classification with that of a panel of experts. (see page 337)

### Rules

Read all 22 descriptions and classify each, using the definition diagram. Check with the Expert Classification on page 337 and rate yourself:

If you missed more than six:	Beginner
If you missed five or six:	Advanced
If you missed three or four:	Expert
If you missed one or two:	Champion
If you missed none:	You peeked!

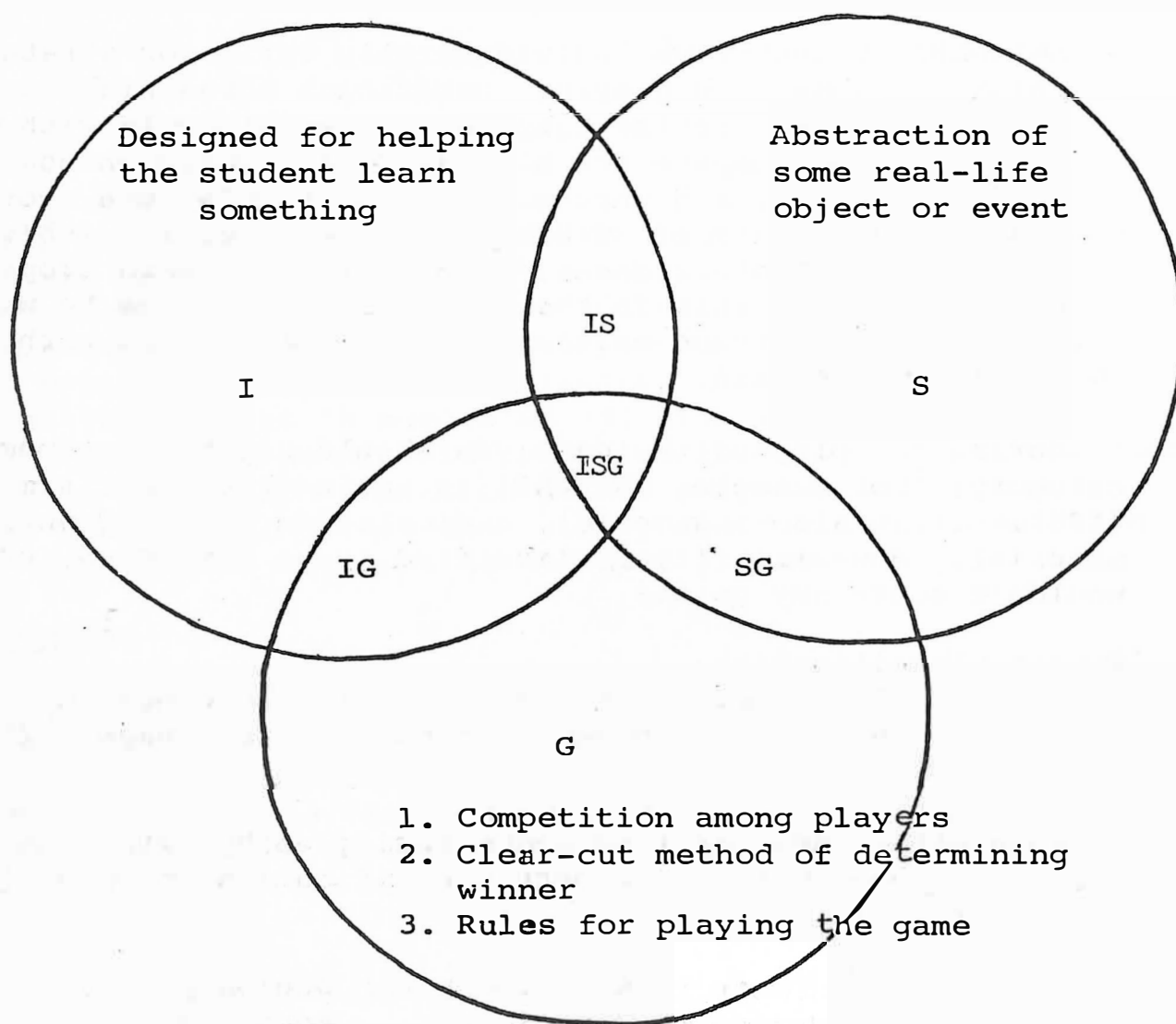


FIGURE 1.

DEFINITION DIAGRAM. KEY TO ABBREVIATIONS

I Instructional Material

S Simulation

G Game

IS Instructional Simulation

IG Instructional Game

SG Simulation Game

ISG Instructional Simulation Game



## GAMEGAME II - ITEM DESCRIPTIONS

### How to Use this Definition Diagram

Read the description of the item carefully and figure out to which circles it belongs. Notice that it has to have all three attributes to belong to the game circle. If the item belongs to only one circle, then classify it with the label for the circle. If it belongs to two circles, use the label from the overlapping area of both circles. If it belongs to all three circles, use the ISG label from the central intersection.

1. High school students learn anthropological concepts and archeological techniques by playing DIG. The class is divided into two teams. In Phase I of the game, each team creates its own civilization with specific details of government, religion, and economy. In Phase II, members of the team create artifacts to reflect their culture and bury them. In Phase III, teams "excavate" each other's sites using standard archeological procedures and simulated museum forms. In the final phase, both teams explain their findings to each other and see how accurately they reconstructed the "past." There are no winners or losers in this game. Instead, students cooperatively evaluate the project.
2. EXTINCTION is a board game for two to four players at the high school level. It is designed to illustrate various principles of ecology. Each player sets up a colony of a given species in Darwinia with a specific litter size, habitat, mobility, predation, defense, resistance to environmental changes, and ability to cross barriers. Players spin a spinner and undertake such ecological actions as reproduction, migration, and gene change. If the game is played to its end, the player with the surviving species is the winner. However, the game may be stopped at the end of a prespecified time. In this case, the player with the most highly populated species is the winner.
3. GHETTO is one of the best known instructional simulations. Materials for this game include a game board, various chance cards, role profiles for four male and six female ghetto residents, and a coordinator's manual. The game is tightly structured with the rules reflecting the realities of ghetto life. Each round of the game consists of each player receiving and distributing "hour chips" on a variety of activities including hustling. The object is to get as many reward points during the round as possible and also to improve the chances of learning in future rounds.

4. Primary grade children learn to listen, follow directions, and use languages by playing MATRIX GAME which contains a kit of 20 matrices. The child must study the matrix and figure out the pattern of similarities and differences. He is required to apply this knowledge to identify missing elements in a particular picture and similar activities.
5. GAMEGAME I is a simulation/game on the design of simulation/games. The structure of the game reflects the workings of a funded project for instructional development. Development teams are awarded generous play-money grants and given the requirements for a game. Team members go through the process of consulting experts, designing simulation games, trying them out, and modifying them. Although there are no winners or losers in the game, most players reach the objectives of learning how to design games and to cope with the problems of working on a funded project.
6. Teaching Problems Laboratory is an elaborate simulation package for preservice and inservice teacher training. It consists of 11 sound films and other materials to create a simulated institution. The trainee receives record folders, faculty handbook, curriculum handbook, reading progress report, sociograms, and other documents to create a strong feel for the imaginary school. The trainee is presented with a problem which he has to solve within the role of a fifth-grade teacher. There is no interaction among different players during these activities.
7. To play the game ELEMENTS one should have some previous knowledge of chemical elements. The game gives you practice in ordering the elements through a board and different tokens with chemical symbols on them. Players begin with equal numbers of tokens. Through a series of moves, they attempt to order all the elements. The first player to do so wins the game.
8. FORMPLAX is a new game for teaching chemical formulas and equations. Each atom or radical is represented by a color-coded plastic shape. The valency of the element is indicated by the number of indentations on one side of the shape. This permits a student to combine the pieces in only those ways which are chemically possible. The pieces can be used to illustrate the balancing of equations.
9. GAMEGAME II teaches players how to discriminate between different instructional, simulation, and game materials. Players randomly choose one of 30 different descriptions and individually clarify it into one of seven different categories. The scoring system is related to both the correctness and

relative difficulty of discrimination: The more people who make an error on an item (indicating that it requires a finer discrimination), the more points are scored by players who make the correct classification. The first player to accumulate a predetermined number of points wins the game.

10. Thinking Man's Golf is a board game which features all scenes of a major golfing event. Each player makes such decisions as which club to use and how to account for wind. The result of each shot is determined by the type of club used and the throw of dice. The game is based to some extent on actual results of pro tournaments.
11. Actionalysis "facilitates the development of perceptual and behavioral repertoires of the participants, particularly in verbal interaction." It includes a series of simulated interactions which approximate real-life situations. In each round two players role-play for three minutes. During the next three minutes observers discuss their observations. This is followed by a longer discussion by all participants.
12. On-Sets is one of Layman Allen's games to teach set theory. Materials for the game include cards with different colored circles and cubes with different colors, numbers, and set-theory symbols. The game requires players to make equations to yield a given number of cards. There is an elaborate set of rules which control the way a player can permit, require, or forbid the use of a cube. The winner of the game is the one who has the highest score at the end of the game.
13. Huemanica Tic-Tac-Toe is a new twist on the traditional game. There are two layers of three rows illuminated by a light box. Players use transparent plastic squares of red, yellow, and blue. The object of the game is to place appropriate colors on both levels to create secondary colors of green, orange, or purple and get three of them in a row!
14. System I is an extremely flexible learning game. Materials for the game include tiles with different terms ("data units") and a blank matrix board with the rows and columns labeled with category names. Although there are a number of variations, the basic move in the game is to place a tile in its appropriate cell in the matrix. Scores are awarded for either successfully categorizing a tile or challenging another player's categorization. The most important feature of the game is that the terms on the tiles and categories on the board can be changed by the teacher

to provide instruction in any topic of his own choice. A comprehensive, but slightly confusing, instructor's manual explains how the game can be used in different subject-matter areas to serve different instructional functions.

15. The creation of "wage-price spirals" is one of the six different economic principles a student experiences and learns by playing Economic System. This complex game, which may last as long as 20 class periods, involves the roles of farmers, manufacturers, and workers. It simulates the economic system at different levels of sophistication. Complex interrelationships between supply and demand, production and consumption, price and wage, and other such factors are reflected in the rules of the game. The player with the highest satisfaction (consumption) point at the end of the game becomes the winner.
16. Mille Bornes is a card game which simulates a 1,000-mile automobile trip. The cards represent different traffic signs, road hazards, safety devices, and miles covered. Players take turns laying down a card and trying to be the first to accumulate a total of 1,000 miles. During his turn, a player may choose to block his opponent by playing a hazard card which stops the progress until covered by a specific remedy card.
17. Your students can relive the civil rights struggles of 1954-68 by playing Pursuit. At the end of the game all students identify with the civil rights revolution and white students develop some empathy for blacks. The structure and rules of the game reflect real-life events. For example, players in the North have the most and players in the South have the fewest advantages. At the beginning of the game each player decides how many points he will score in five different areas. Winning the game depends both on total points and on how close the player comes to his individual goals. Thus the game rewards realistic goal setting.
18. Search is designed to be played only once to acquire various library research skills. Players make up teams and compete for LIPs (Library Intelligence Points) by completing library search assignments. In later stages of the game each team sets up problems for other teams to handle and solves those given to it. The team with the most LIPs at the end of the game is declared winner.
19. Twixt is a game of strategy. The object of the game is to place plastic pegs in strategic holes and link them in such a way that they form an unbroken connection between two edges of the game board. At the same time, each player blocks his opponent from doing the same thing on his side.

20. Inter-National Simulation Kit is one of the earliest instructional games patterned somewhat after war games. Teams represent different nations and team members assume the roles of public officials. The game, like the situation it simulates, can become very complex: Trade agreements, wars, negotiated settlements, political alliances, revolutions, and world conferences, are likely to take place. The game director specifies the military, economic, and political character of each nation and lets its citizens decide whether to use the resources for achieving domestic satisfaction or international domination. Decisions are recorded on forms enabling various calculations to be made. At the end of the game the nation with the highest degree of both satisfaction and security is the winner. Instructional objectives of the game call for better understanding of the international situation; impressive evaluation data confirm that the game is capable of helping the players attain this goal.
21. Cross-Number Puzzles help children develop computational skills through highly motivating means. Each puzzle requires the child to complete a computation and transfer the correct answer to numbered spaces down or across a crossword form diagram.
22. Rucker-Gable Educational Programming Scale places a teacher in a simulated situation where he has to make decisions about what is the best educational program for an individual child. The teacher is given 30 brief descriptions of different children and is asked to decide which one of seven different educational settings would be optimal for each child. From an analysis of the teacher's choices, experimenters are able to reliably measure the test taker's attitude toward alternative approaches to handling handicapped children.  
(See page 327 for answers.)

### SIMULATION GAMES

Simulation games are designed to provide practical classroom learning experiences by involving the participants in activities that emulate real life situations in a controlled environment.

Simulated games vary greatly in their complexity and degree of difficulty. Thus it is essential that an evaluative examination be undertaken by the teacher prior to their classroom use.

#### I. Selecting Games

Simulation games should be selected according to the following criteria.

A. Interests of the proposed participants

Games must be considered in light of meeting group needs and providing experiences that will relate to the participants environment. Occasionally, games can be used that relate to other environments or situations in which the group has exhibited an interest.

B. Abilities of Participants

Games vary in their degree of difficulty. Some games have complicated rules, scoring tables, and multiple score sheets, while other games are relatively simple. A simulated game should challenge the participants knowledge and skills in problem solving but should not cause the participant to feel frustrated. The reading level of the rules, and the math level involved in the scoring progress are prime areas of consideration in trying to ascertain the difficulty level of a game.

C. Game Objectives

The objectives of the game should provide relevance and validity to both the course content and the participants needs. Are important concepts complicatedly stated, misconstrued, oversimplified, or completely neglected ?

D. Game Model and Materials

Materials and equipment to play the game should be either included in the package or readily accessible. Models should be provided through the use of a medium (filmstrips, cassettes, transparencies) that enables the participants to easily understand the game skills and procedures.

E. Time-Space Utilization and Players Involvement

Facilities and playing time are of prime importance. Simulated games differ in design with varying degrees of consideration given to the following problems:

1. large group to small group involvement,
2. single setting requirements to multiple settings requirements,

3. limited time periods to extended time periods,
4. single sessions to multiple sessions.

## II. Utilizing Simulated Games

### A. Preparation for Play

Preparation should include:

1. examination of required materials for the correct quantities and completeness,
2. consideration for distribution of materials,
3. arrangement of playing setting(s), including needed resource materials and media equipment,
4. organization and explanation of individual or group roles.

### B. Presentation of the Game

Pre-game discussion should attempt to stimulate student interest by stressing the understanding of both the value and purpose of the game as well as the actual contents and playing procedure.

### C. Playing the Game

The teachers should serve primarily as directors, clarifying game rules and procedures. Teachers should not become actively involved in the game strategy or interfere in the discovery process.

### D. Post Game Follow-up

A discussion of game strategies in relationship to real life is extremely beneficial in reinforcing acquired concepts or skills. The discussion should also provide an opportunity to clarify misunderstandings about game procedures and incorporate modifications that could lead to improvement of future game sessions.

## E. Evaluation

Evaluation should be accomplished as indirectly as possible. The games are designed to foster discovery techniques rather than memorization techniques. Thus, traditional testing might significantly alter student involvement in future simulated game sessions.

### HOW TO DESIGN A GAME

by

Samuel A. Livingston

All games have certain common elements. You will probably find it helpful to consider them in a logical order as you analyze the real-life situation you intend to simulate and construct your game model.

1. Identify the roles of the players in your game. In some games all the players take the same role; in others they take different roles. But in any good game, players represent only those persons or groups whose decisions affect the outcome.
2. Determine each player's goals and choose a measure of success for each player. The measure may be a concrete unit (such as dollars or votes) or an abstract unit (such as points or credits). Of course, two players cannot compare their scores unless the scores are expressed in the same unit of measurement.
3. Identify the resources available to each player, which he can use to influence the outcome in his favor. These also may be concrete objects (such as factories, men or money) or abstract qualities (such as prestige or ability). When you have identified each kind of resources, determine their relative importance--that is, their power to influence the course of events, either directly or by influencing the decisions of other players.
4. Determine the interactions between players in the game. That is, the way in which each player's actions affect the other players and their chances for success. Generally, interactions can be classified as cooperative or competitive, although two players may both cooperate and compete with each other in the same game.



5. Determine the sequence of events. This may be a series of repeating cycles or a single, non-repeating sequence. It may have a natural conclusion or be of indefinite length. If it is of indefinite length, you will have to devise a means of deciding when the game is over. This could be at the end of a given time (as in basketball or football), at the end of a given number of repetitions of the sequence (as in baseball), or when one player has reached a certain score (as in volleyball or ping-pong). If you do use an artificial means of ending the game, you may have to adjust the scoring to avoid encouraging special end-game strategies that would not make sense in the real life situation.
6. Determine the external factors--that is, those outside the players decisions and actions that will affect the outcome. These would include the actions of participants in the real-life situation who are not represented by players in the game. Some of the external factors will be constant, some will depend on the other conditions of the game, and some will be affected by chance. You can allow for chance factors by using dice, cards, or spinners, but the probabilities implied should match those in the real-life situation, (if it is possible to know what they are).
7. Identify the physical factors affecting the outcome of the situation and organize them onto a playing board. (Sometimes it may be convenient to have a separate board for each player instead of one large board for the whole game). If the most important physical factors are geographic, the board will probably take the form of a map. If they are not geographic, it will probably be a systematic diagram of some kind. If the physical factors are unimportant, there may be no board at all.

The final version (if indeed there is such a thing) of a simulation game is very seldom the same as the designer's first version. Several experimental playings of a game are usually needed to get all the "bugs" out of it. In revising and refining a simulation game, there are two basic considerations: realism and playability.

Realism demands that the choices of strategy available to the player in the game correspond to those available to the participants in the real-life situation. It requires that the immediate results-- the rewards or punishments for the player--correspond to those which he would experience as a participant in the real life situation. And

it requires that the final outcome of various combinations of player strategies and external factors reflect those of the same combinations of factors in the real-life situation.

The requirements of playability are somewhat harder to define, but it is a good idea to avoid the following characteristics:

1. Idle time for the player.
2. Complex calculations that must be made during the game-- they often produce errors. (Sometimes these can be avoided by making a table that players can consult during the game).
3. Complicated or confusing materials, board layouts, and rules.
4. Rules that are easily misunderstood or likely to be intentionally violated.

Certain conflicts often arise in the design of a simulation game. One difficult decision involves the choosing between the use of tokens and pencil-and-paper calculations to represent physical items. Tokens have the advantage of being something tangible that the players can handle and exchange. They also help to keep errors from going unnoticed. On the other hand, the use of tokens requires that quantities be expressed in small whole numbers, which often is not realistic. Pen-and-paper calculations permit the use of large numbers or small fractions. Which method you use will depend on the type of items you are trying to represent and the age, interests, and abilities of the players you are designing the game for.

Another problem that simulation-game designers face is the conflict between simplicity and accuracy. Obviously, a simulation game must simplify the real-life situation in order to be playable. But over-simplification destroys the accuracy needed for realism. This problem can be lessened by making the game playable at different levels of complexity, introducing complications which make the game more realistic after the players have mastered the simpler versions.

## Expert Classification for GAMEGAME II

Actionanalysis: IS (There are no winners or losers in this simulated activity. Hence it is not a G.)

Dig: IS (There is no clear-cut method for determining who won. It is obviously a simulation of the real-life activity of archeologists.)

Economic System: ISG (It has everything.)

Elements: IG (It is a game because it has rules, competition, and winners.)

Extinction: ISG (It has everything.)

Formplax: I (Although it sounds like fun, there is no competition. It is just an instructional activity and not a game.)

Cross-number Puzzles: I (Although this activity sounds like fun, it is not a game because there is no competition.)

Gamegame I: IS (It is a simulation of working on funded projects. It is not a game because there are no distinct winners or losers.)

Gamegame II: IG (The purpose is to help players learn the skill of classifying games.)

Ghetto: ISG (Although the game element is deemphasized, it is still a game, because there are elements of competition, winning, and rules for each round.)

Huermania Tic-tac-toe: G (Although you may learn about primary and secondary colors by playing this game, its original purpose is entertainment.)

Inter-national Simulation Kit: ISG (It has everything.)

Matrix Games: I (There are play rules, but competition is deemphasized and there are no winners or losers.)

Mille Bornes: SG (The game simulates an automobile trip, but it is not designed with the purpose of teaching anything.)

On-sets: IG (What the student does is not a simulation. He actually manipulates elements of a set.)

Pursuit: ISG (It has everything.)

Rucker-Gable Scale: S (The purpose is to measure and not to instruct. It is not a game. The test taker makes simulated decisions.)

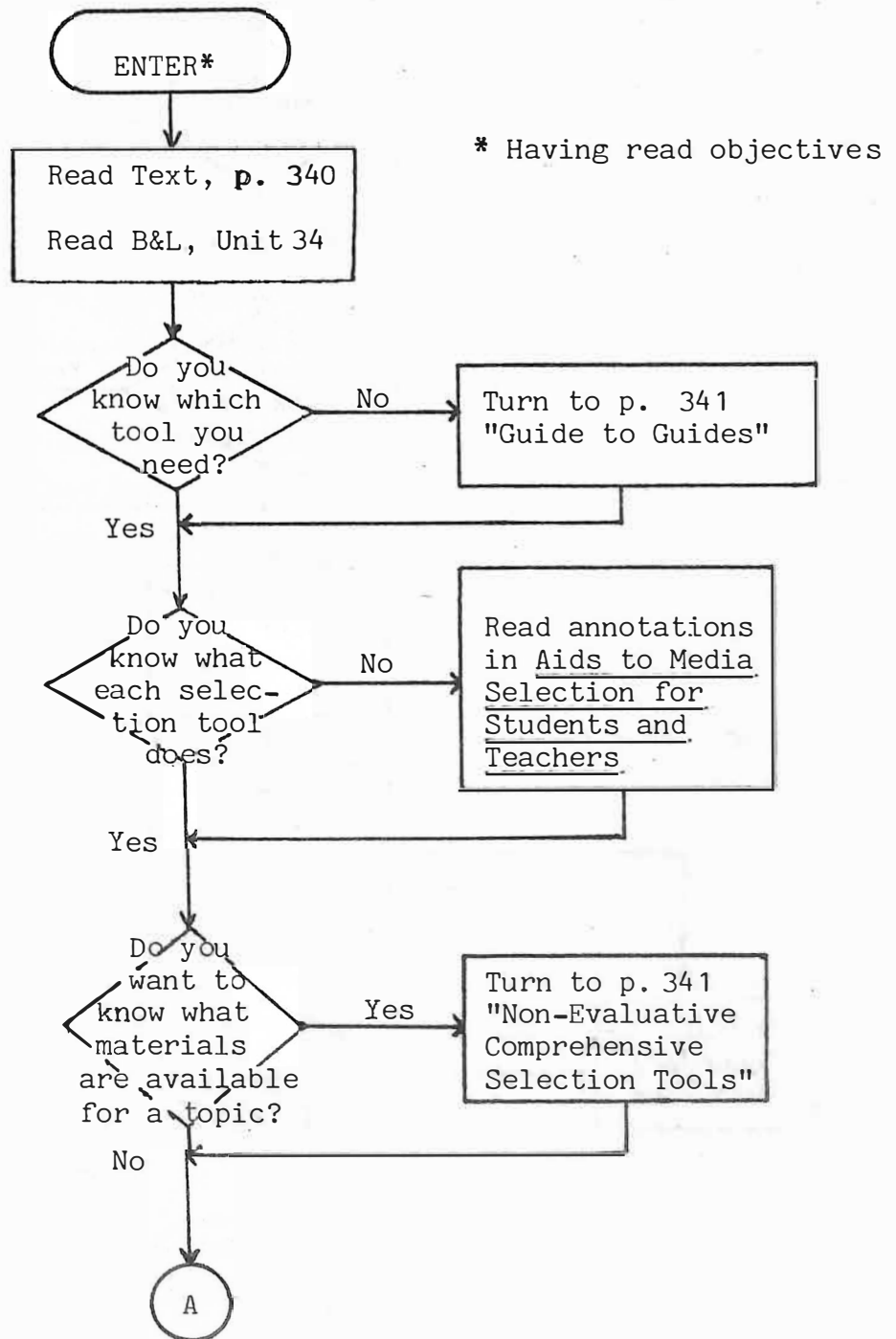


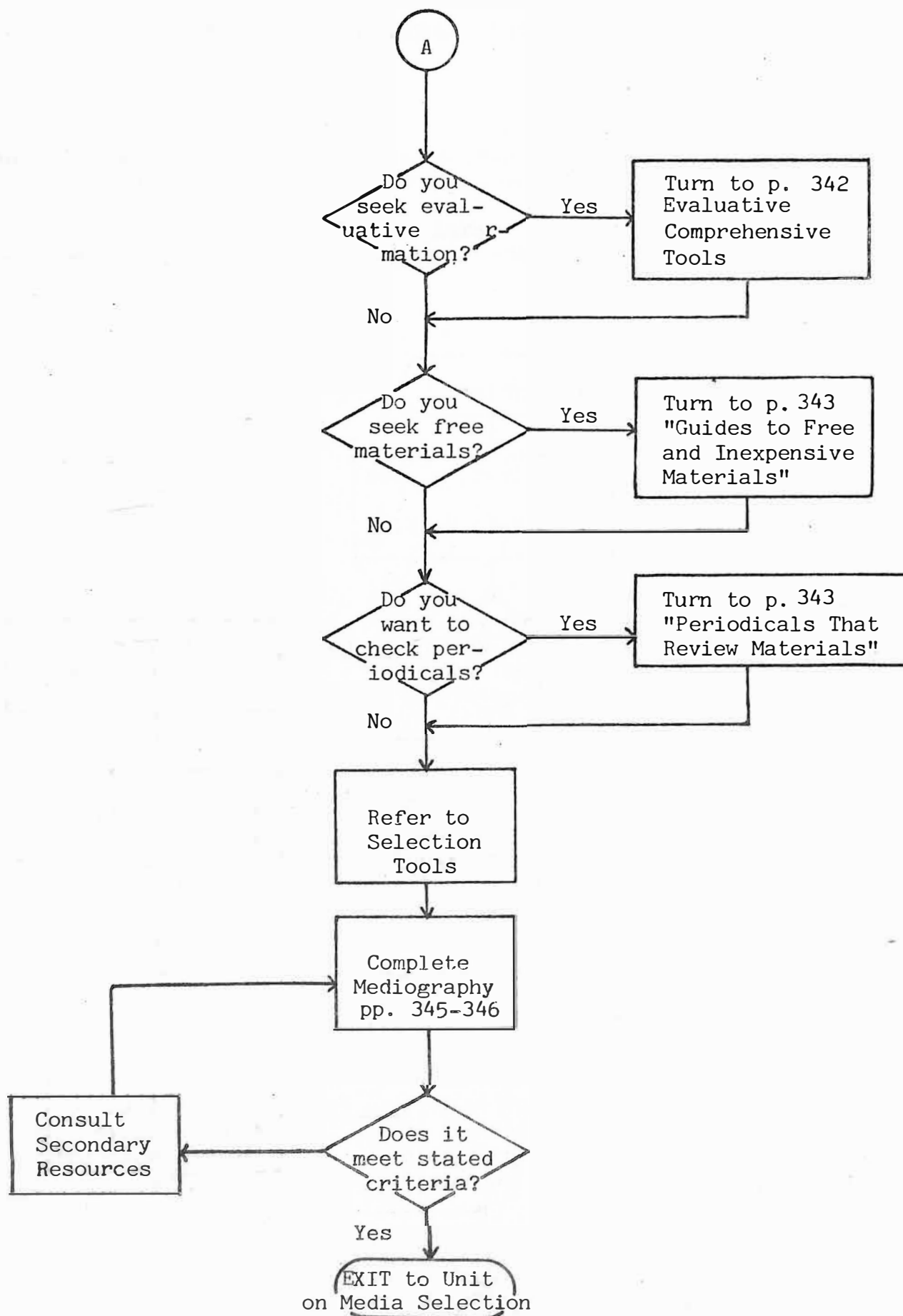
## LEARNING RESOURCE SELECTION TOOLS: WHERE TO FIND THE MEDIA

### Instructional Objective:

1. Given a variety of selection tools, be able to locate a variety of media materials about a specific subject representing each class of media presented in this course.
2. Be able to complete a mediography of available instructional resources.

### Task Sequence:





## Learning Resource Selection Tools: Where to Find the Media

The tasks of selecting and subsequently utilizing media must be anteceded by finding media to select. Before you can evaluate any materials, you must first know what is available. If you plan to teach a specific unit of instruction, you need to find out what materials are available on the subject and if possible, how other educators rate them. This need can be fulfilled by the use of a variety of available selection tools. These tools or guides list, usually by subject, instructional titles, authors, publishing information, and descriptions of the resources.

Locating materials has become increasingly difficult as the number of resources has increased. It is estimated that 15 - 25,000 new titles are published annually. Add these to the existing million currently available and it becomes difficult enough to keep track of what is available, let alone how good it is. Most of these tools will only aid you in locating the materials. The evaluation of materials is such a prodigious task that so few are unsystematically attempting, that little consistent evaluative information is available. The few journals and organizations, such as the Educational Product Information Exchange and Educational Film Library Association that are dedicated to evaluation, can only make a dent in the task. Only one journal, Previews, exists for the purpose of publishing evaluations of non-print materials. Others contribute, but the point is that to be successful, a coordinated government-sponsored effort is necessary.

This unit is designed to introduce you to some of the more prominent tools available for locating resources. Through developing your bibliography, you should become aware of what they are and how to use them. In addition to the basic sources included in this unit, several specialized bibliographies exist, i.e., catalogs of materials on special topics, such as biology, science materials, black literature, ecology, etc. These have proliferated to such a degree that any attempt to produce even a representative list would be beyond the scope of this course.

If you are at all persistent, you should be able to find what you are looking for. Happy hunting.

Guide to Guides:

If you're hunting selection tools, this is the right place. The following is a list of the more popular guides to selection tools (most of which are available in the McNutt reference collection):

Aids to Media Selection for Students and Teachers. Washington: U.S. Office of Education.

Index to Instructional Media Catalogs: A Multi-Indexed Directory of Materials and Equipment for Use in Instructional Programs. New York: R. R. Bowker, 1974.

International Index to Multi-Media Information. Audio-Visual Associates. Published quarterly. Pasadena, California: Audio-Visual Associates.

Perkins, Flossie L. Books and Non-book Media; Annotated Guide to Selection Aids for Educational Materials. Revision of Book Selection Media. Urbana, Ill.: National Council of Teachers of English, 1972. 298 pp.

Rufsvold, Margaret I., and Carolyn Guss. Guides to Newer Educational Media: Films, Filmstrips, Kinescopes, Phonodiscs, Phonotapes, Programmed Instruction Materials, Slides, Transparencies and Videotapes. 3rd ed. Chicago: American Library Association, 1971. 116 pp.

Sources of Motion pictures and Filmstrips. Rochester, N.Y.: Eastman Kodak Co., 1971. 22pp.

Non-Evaluative Selection Tools (most of these are also available):

The following are lists or bibliographies compendia of instructional resources. The authors have made no attempt to evaluate the materials. These tools simply tell you what has been produced and who produced it:

Chisholm, Margaret E. Media Indexes and Review Sources. College Park, Md.: University of Maryland, School of Library and Information Services, 1972. 84 pp.

Education's Purchasing Guide. 4th ed. Philadelphia: North American Publishing Co., 1972. 1,200+ pp.

Educational Media Index. New York: McGraw-Hill, 1968.

Hendershot, Carl H., comp. Programmed Learning: A Bibliography of Programs and Presentation Devices. 1973 ed. Bay City, Mich.: The Compiler, 1973.

Learning Directory. New York: Westinghouse Learning Corporation, 7th vol., 1972. (supplemental published in 1975)



Lekan, Helen A., ed. Index to Computer-Assisted Instruction. 3rd ed. New York: Harcourt Brace and Jovanovich, Inc., 1971. 390 pp.

Limbacher, James L. Feature Films on 8mm and 16mm: A Directory of Feature Films Available for Rental, Sale, and Lease in the United States. 3rd ed. New York: R. R. Bowker, 1971. 269 pp.

McDaniel, Roderick, ed. Resources for Learning: A Core Media Collection for Elementary Schools. New York: R. R. Bowker, 1971.

National Center for Audio Tapes Catalog, 1969-71. Boulder, Colo.: National Center for Audio Tapes Catalog, 1969-1971. 123 pp.

National Information Center for Educational Media (NICEM), University of Southern California, has compiled the following indexes:

Index to Educational Audio Tapes. 3rd ed. 1974. 720 pp.

Index to Educational Overhead Transparencies. 4th ed. 1974. 1,229 pp.

Index to Educational Records. 3rd ed. 1974. 762 pp.

Index to Educational Video Tapes. 3rd ed. 1974. 380 pp.

Index to 8mm Motion Cartridges. 4th ed. 1974. 658 pp.

Index to 35mm Educational Filmstrips, Second Edition. New York: R. R. Bowker, 1970. 872 pp.

Index to 16mm Educational Films. New York: R. R. Bowker, 1977. 1,111 pp.

New York Library Association. Cheildren's and Young Adult Services. Records and Cassettes for Young Adults. The Association, 1973.

New York Library Association. Films for Children. New York: The Association, 1970. 32 pp.

New York Library Association. Films for Young Adults, A Selected List and Guide to Programming. Rev. ed. 1970. New York: Educational Film Library Association, 1970. 54 pp.

U.S. Government Films: A Catalog of Motion Pictures and Filmstrips for Sale by the National Audiovisual Center. Washington: National Archives and Records Service, General Services Administration, 1969. 165 pp.

#### Evaluative Selection Tools:

Educational Film Library Association. Educational Film Library Association Evaluations. New York: The Association, 1965.

Educational Film Library Association. Film Evaluation Guide. New York: The Association. Supplement, 1965-1967, (c) 1968. Supplement 1967-1971.

Educational Film Library Association. Film Evaluation Guide. Supplement One, 1965-1967; Supplement Two, 1967-1971. New York: The Association.

Markham, Lois, ed. New Educational Materials, A Classified Guide. New York: Citation, 1970. 256 pp.

Zuckerman, D. and R. Horn, eds. The Guide to Simulations/Games for Education and Training.

Elementary School Library Collection, 10th ed. BroDart, 1970.

Rice, S. Films Kids Like. American Library Association, 1973.

#### Free and Inexpensive Selection Tools (Freebies):

Aubrey, Ruth H. Selected Free Materials for Classroom Teachers. Fearon, Palo Alto, Calif.

Bever, Esther. Sources of Free and Inexpensive Educational Materials. Field Enterprises, Chicago, Ill.

Educators Guide to Free Films, compiled and edited by Mary Foley Horkheimer and John C. Diffor. 32nd ed. Revised, June, 1972.

Educators Guide to Free Filmstrips, compiled and edited by Mary Foley Horkheimer and John C. Diffor. 24th ed. 1972. 161 pp.

Educators Guide to Free Tapes, Scripts, Transcriptions, compiled and edited by Walter A Wittich. 19th ed. 1972. 241 pp.

Guide to Government Loan Film (16mm). The Third Edition (1974-1975). Alexandria. Va.: Serina Press, 1975. 185 pp.

Elementary Teachers Guide to Free Curriculum Materials, edited by Patricia H. Suttles. 29th ed. 1972.

Free and Inexpensive Learning Materials, 17th edition. Division of Surveys and Field Services, George Peabody College of Teachers, 1974. 244 pp.

Miller, Bruce. Sources of Free and Inexpensive Teaching Aids, Bruce Miller Riverside, Calif.

Pepe, Thomas J. Free and Inexpensive Educational Aids, Dover, N.Y.

Salisbury, Gordon. Catalog of Free Teaching Aids, Gordon Salisbury, Riverside, Calif.

#### Periodicals:

A number of trade periodicals review new educational products, some more systematically than others:

Audiovisual Instruction. Association for Educational Communications and Technology, Inc. Monthly, September through May, with a combined June-July issue.

AV Guide (formerly Education Screen and AV Guide). Educational Screen, Inc. Monthly.

The Booklist. American Library Association. Twice a month, through July, and once in August.

Education Screen and AV Guide. Educational Screen and Audivisual Guide. Monthly.

EFLA Evaluations. Educational Film Library Association. Monthly.

Film News. Film News Company. Bimonthly.

Harrison Tape Catalog. M. and N. Harrison, Inc. Bimonthly.

Instructor. Instructor Publication, Inc. Monthly with combined August/September and June/July issues.

Landers Film Reviews: The Information Guide to 16mm Films. Landers Associates. Monthly, September through May.

Modern Media Teacher. George A. Pflaum. 5 issues a year.

Previews. R. R. Bowker Company. Monthly, Septmeber through May.

School Library Journal. R. R. Bowker. Monthly, September through May.

## MEDIOGRAPHY

### Assignment # 17

#### BEHAVIORAL OBJECTIVE

The student will list a total of 6 titles of media from at least 3 different categories from at least two different sources. He/she will choose types of media from among such categories as: overhead transparencies, filmstrips, slides, 16mm motion pictures, 8mm filmloops, audio tapes, videotapes, still pictures (flat), cassette tapes, etc. The student will cite commercial listings for MEDIA TO BE SELECTED ON THE BASIS OF WHICH SUBJECT YOU INTEND TO TEACH.

#### Directions:

The important thing in this assignment is for you to develop a useful record of media items. We are going to take a few liberties with current cataloging practice in order to standardize the mediography for all types of listings. Follow the outline given below as closely as possible:

Where the Wild Things Are (sound filmstrip), Maurice Sendak, Weston Woods, 1962. 1 filmstrip, 42 frames.

Grimm's Fairy Tales (audio cassette), Canadian Career Society, Moreland-Latchford, 1967, 16 minutes.

NOTE: These are the basics to list: Title of Content; Type of Media, Author/Producer, Distributor, copyright, Number of items and/or their length. Cite the source from which the reference came below (eg., NICEM, Learning Directory, etc.).

#### Common Media Abbreviations

B&W	Black & White	RPM	Revolutions per minute
COL.	Color	S	Side
FR.	Frame(s)	SD	Sound
IN.	Inches	SI	Silent
MM	Millimeters	STEREO	Stereophonic
MONO	Monaural	CASS	Cassette
		FL	Filmloop

Write out a citation for software on the same subject.

# EVALUATION

Name \_\_\_\_\_

## Scale Range

## Student

## Instructor

0 - 5 Adherence to medio-  
graphic form

\_\_\_\_\_

\_\_\_\_\_

0 - 5 Similarity of titles  
to subject

\_\_\_\_\_

\_\_\_\_\_

0 - 5 Variety of forms of  
media

\_\_\_\_\_

\_\_\_\_\_

TOTALS

\_\_\_\_\_

\_\_\_\_\_

## Grading Scheme:

13 - 15 = A

11 - 12 = B

9 - 10 = C

(Attach to assignment when submitted)

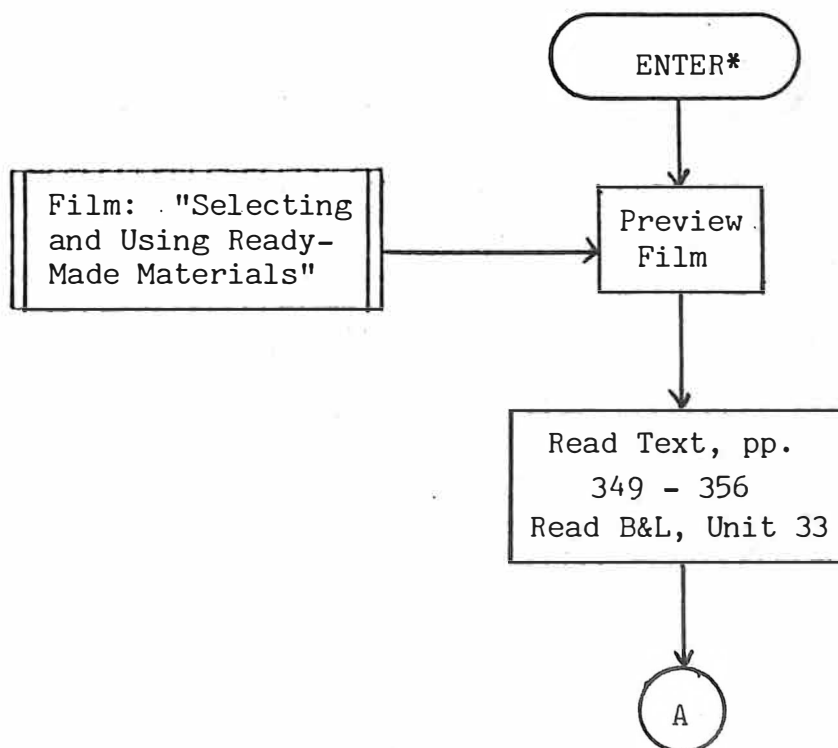


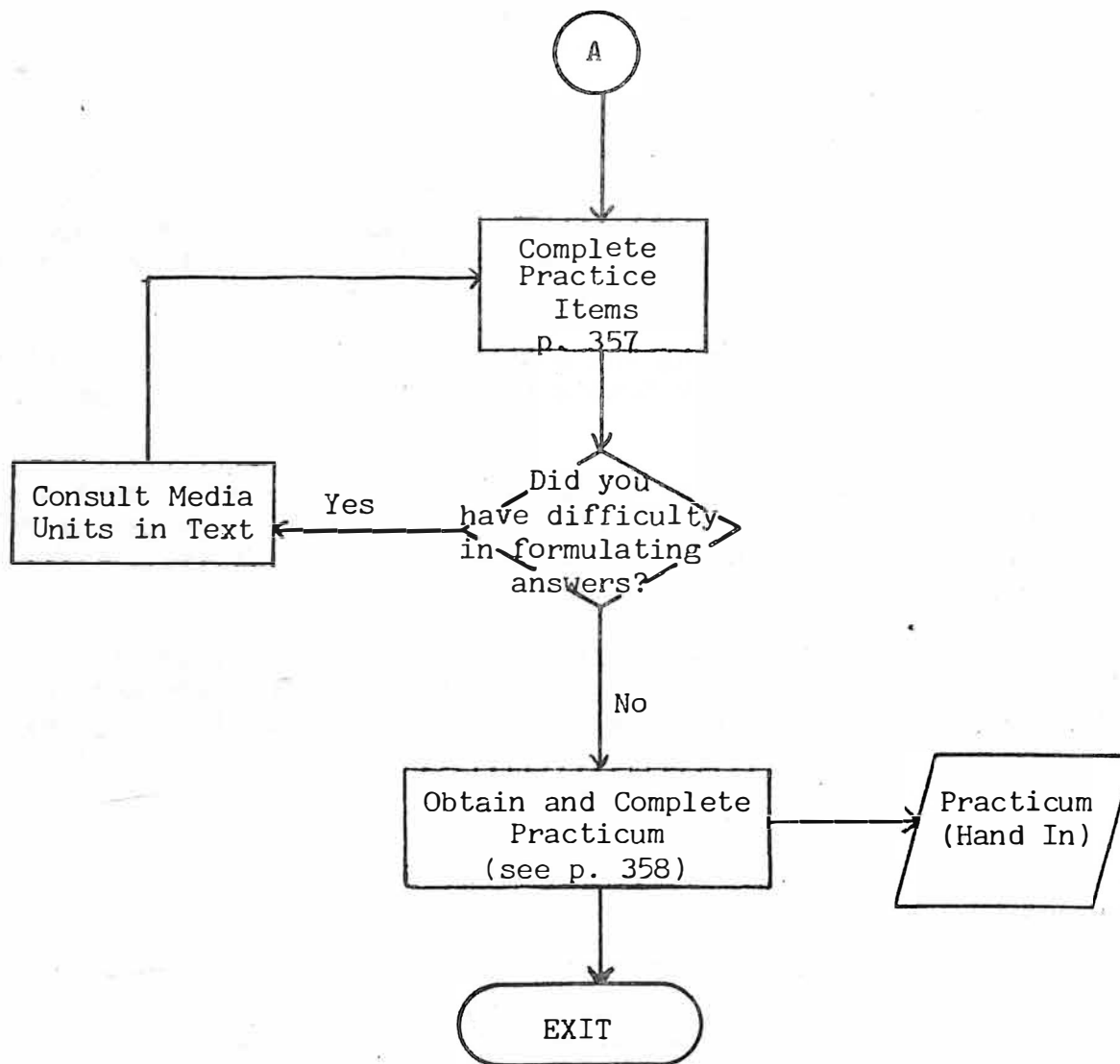
## MEDIA SELECTION

### Instructional Objective:

1. Be able to state the media selection rule.
2. Given any instructional media materials (software), be able to apply the "Criteria for Selection of Nonbook Materials" (Hicks & Tillin) and other stated criteria in evaluating and selecting those items.
3. Given an instructional setting and a statement of instructional intent (objective), be able to apply Kemp's flowchart in selecting appropriate media types.
4. Using the "Generalized Summary of Media Characteristics" (Duane) and the other units of this text, be able to list the characteristics of any medium and determine which make it appropriate or inappropriate for any given instructional situation.
5. Given an instructional situation stating an objective, learner characteristics, and instructional setting, be able to select the most appropriate medium (media), justifying the choice with specific, logical reasoning.

### Task Sequence:







## Principles of Media Selection and Utilization:

A MEDIUM OF INSTRUCTION SHOULD  
BE SELECTED ON THE BASIS OF ITS  
POTENTIAL FOR IMPLEMENTING THE  
STATED OBJECTIVE OR PURPOSE.

The principle is generic. In this form, it was stated first by Gerlach and Ely in their book. What is actually being stated is that media should be selected on the basis of their ability to establish the conditions under which the objective can be accomplished. The distinction may not be obvious, but it's important. Think about it. This is the primary rule of media selection. Read it again. Repeat it without looking at the text. Remember it! Use it! Other ancillary principles of selection and utilization that seem to make sense are:

1. No one medium is best for all purposes. While educators have been seeking panaceas for years, thinking with the development of each new technology that it had finally arrived, no one medium is most appropriate for teaching different kinds of learners or different kinds of objectives.
2. Each medium has certain characteristics or attributes (color, motion, overt practice, zooming, programming) that make it more appropriate for certain instructional situations.
3. Many media are capable of being presented in different ways. They should be depending upon the instructional setting.
4. Media should be selected and used in a manner consistent with the learning styles and capabilities of the students.
5. Selection and media use should be as consistent as possible with the nature or level of the learning task (eg., for concept objectives, information should be presented and classified by medium as concepts).
6. When selecting and using media, be familiar with the content, techniques, and characteristics of the medium, i.e., PREVIEW IT.
7. Don't use media simply because they are available. Media should not be baby-sitters or time-killers. Students will perceive the lack of importance ascribed to media utilization and react accordingly when all media are used, invalidating its effective use for any purpose.
8. Media generally vary in their ability to accomplish specific types of learning tasks. Table 1 states the general potential (high, medium, low) of media types for accomplishing different types of learning.
9. When appropriate, you should vary the type of media used. If every time you stand in front of the class you turn on the overhead projector, students will become bored or indifferent to the medium.

Table 1\*

Instructional Media Stimulus Relationships  
to Learning Objectives

## LEARNING OBJECTIVES:

INSTRUCTIONAL MEDIA TYPE:	Learning Factual Information	Learning Visual Identifi- cations	Learning Principles, Concepts and Rules	Learning Proce- dures	Performing Skilled Perceptual- Motor Acts	Developing Desirable Attitudes, Opinions & Motivation
Still Pictures	Medium	HIGH	Medium	Medium	low	low
Motion Pictures	Medium	HIGH	HIGH	HIGH	Medium	Medium
Television	Medium	Medium	HIGH	Medium	low	Medium
3-D Objects	low	HIGH	low	low	low	low
Audio Recordings	Medium	low	low	Medium	low	Medium
Programmed Instruction	Medium	Medium	Medium	HIGH	low	Medium
Demonstration	low	Medium	low	HIGH	Medium	Medium
Printed Textbooks	Medium	low	Medium	Medium	low	Medium
Oral Presentation	Medium	low	Medium	Medium	low	Medium

From Allen, W. H. "Media Stimulus and Types of Learning." Audiovisual Instruction, January, 1967.

\*These are at best rules of thumb and should not be applied as absolute principles when selecting media.

## Characteristics of Media:

Most of this text has been devoted to a statement of the characteristics of the various media. The following Table 2 summarizes.

Table 2. Generalized Summary of Media Characteristics

	Cost	Pacing (fixed, flexible)	Sequencing (fixed, flexible)	Group Size (lg, sm, ind.)	Visual (yes, no)	Motion (yes, no)	Audio (yes, no)	No. titles commercially available (lg, sm, med)	Requires Presentation Device (yes, no)
Printed Materials	Lo	Flex	Flex	Lg/Sm/Ind	Yes	No	No	Lg	No
Filmstrips	Lo	Flex	Fix	Lg/Sm/Ind	Yes	No	No	Lg	Yes
Slides	Lo	Flex	Flex	Lg/Sm/Ind	Yes	No	No	Sm	Yes
16 mm Films	Hi	Fix	Fix	Lg	Yes	Yes	Yes	Lg	Yes
8 mm Films	Med	Fix	Fix	Sm/Ind	Yes	Yes	No	Sm	Yes
8 mm Film Loops	Med	Fix	Fix	Sm/Ind	Yes	Yes	No	Sm	Yes
Overhead Transparencies	Lo	Flex	Flex	Lg	Yes	No	No	Sm	Yes
Audio Recordings	Lo to Med	Fix	Fix	Lg/Sm/Ind	No	No	Yes	Sm	Yes
Video Recordings	Hi	Fix	Fix	Lg/Sm/Ind	Yes	Yes	Yes	Sm	Yes

From: Duane, J. E. "Media as Applied to Individualized Instruction." Audiovisual Instruction, May, 1974.

### Criteria for Media Selection:

1. Appropriateness of the medium for accomplishing the objective with the specific learners is the most important criteria.
2. The level of sophistication of the media presentation (in terms of vocabulary, special effects, content) should be consistent with the ability of the students.
3. The medium should be available, either in the media center or for loan or rent from other libraries or rental agencies.
4. Technical quality has become important, as today's students are inured to the technical sophistication of commercial television. They won't attend to sloppily produced media as well.
5. The cost of rental or purchase should not be prohibitive or considerably greater than a less expensive but effective alternative. Cost effectiveness is becoming a very important criterion.
6. Validity and relevance of the content presented by the medium to your ongoing unit of instruction.
7. Some evidence of validation or field testing should be provided for commercially produced materials. Publishers are becoming aware of the importance of learner verification, but the practice is not yet universal.
8. Material should be contemporary. Students watching older films in which actors or participants are dressed in different fashions (eg., bobble socks, thin ties, and crew cuts) can be so distracting to students that learning detriments will occur.
9. When evaluating any given medium, Hicks and Tillin have provided several relevant criteria for accepting and using the item or rejecting it.

CRITERIA FOR SELECTION OF NONBOOK MATERIALS  
(From Hicks & Tillin. Developing Multimedia Libraries)

POINTS OF QUALITY  
(Accept)

POINTS OF INFERIORITY  
(Reject)

LOOK FOR  
AUTHENTICITY

Accurate facts  
Facts impartially presented  
Up-to-date information  
  
Other acceptable works of producer

Inaccurate facts  
Facts distorted by bias  
Fake revised version: date only  
changed, no up-dating of content  
Consistent rejection of other  
works of producer

APPROPRIATENESS

Vocabulary at user's level  
Concepts at user's level  
Useful data  
Media-subject correlation (e.g., art  
prints to art, specimens to science)  
Titles, captions, etc. related to  
subject  
Narration, dialogue, sound effects  
related to subject  
Individual and/or group use suitability

Vocabulary too easy or difficult  
Concepts too easy or difficult  
Extraneous data  
Media does not add to subject  
concepts  
Titles, captions, etc. confuse  
subject concepts  
Narration, dialogue, sound effects  
unrelated to subject  
Limited individual and/or group  
use suitability

SCOPE

Full coverage as indicated  
Superior concept development by  
this means  
Content to satisfy demands for current  
subjects

Gaps in coverage  
Better concept development by  
other means  
Irrelevance to current topics

INTEREST

Relationship to user's experience  
  
Intellectual challenge  
Curiosity satisfaction  
Credibility  
Imagination appeal  
Human appeal  
Sensory appeal

No relationship to user's cultural  
environment  
No intellectual challenge  
No satisfactory answers  
Implausibility  
Prosaic presentation  
Negative human values  
No stimulation

ORGANIZATION

Logical development  
  
Pertinence of all sequences  
Balance in use of narration and  
dialogue; music and sound effects;  
background elements

Confused development; excessive  
repetition  
Unrelated sequences  
Ineffective or overpowering use  
of the same elements

POINTS OF QUALITY  
(Accept)

POINTS OF INFERIORITY  
(Reject)

TECHNICAL ASPECTS

Tone fidelity	Tone distortion
Clarity	Extraneous sounds, visuals too detailed
Intelligibility	Difficulty in following image and/or sound
In-focus pictures	Fuzzy out-of-focus pictures
True size relationships	Unreal size relationships
Unified composition	Confused composition
Effective color use	Color is less effective than black and white
Complete synchronization	Uneven synchronization of sound and color

SPECIAL FEATURES

Descriptive notes, teachers and/or users guide	Absence of useful notes, guides
Pertinent accompanying material	Unrelated materials packaged together

PHYSICAL CHARACTERISTICS

Ease in handling, for user, for storage	Difficulty in handling
Minimum instruction for individual use	Special training requirements for use
Attractive packaging	Unattractive packaging
Durability	Flimsy construction
Ease of repair	Difficulty in repairing damage

LIBRARY POTENTIAL

Relevancy that promotes communication	No furthering of communication
Flexibility for many effective uses	Features which limit use

SELECTION AIDS

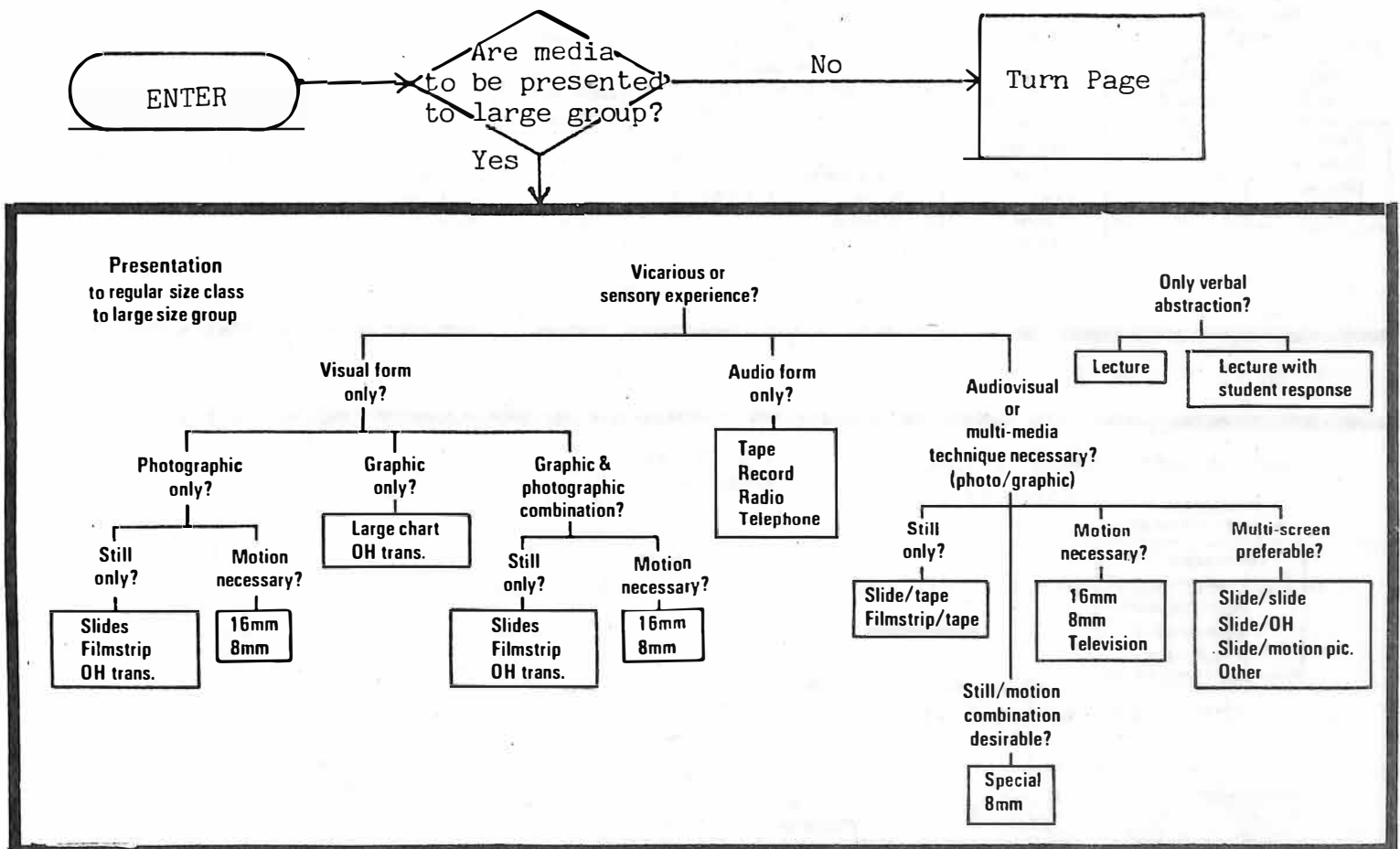
Recommendation in evaluation sources	Rejection in evaluation sources
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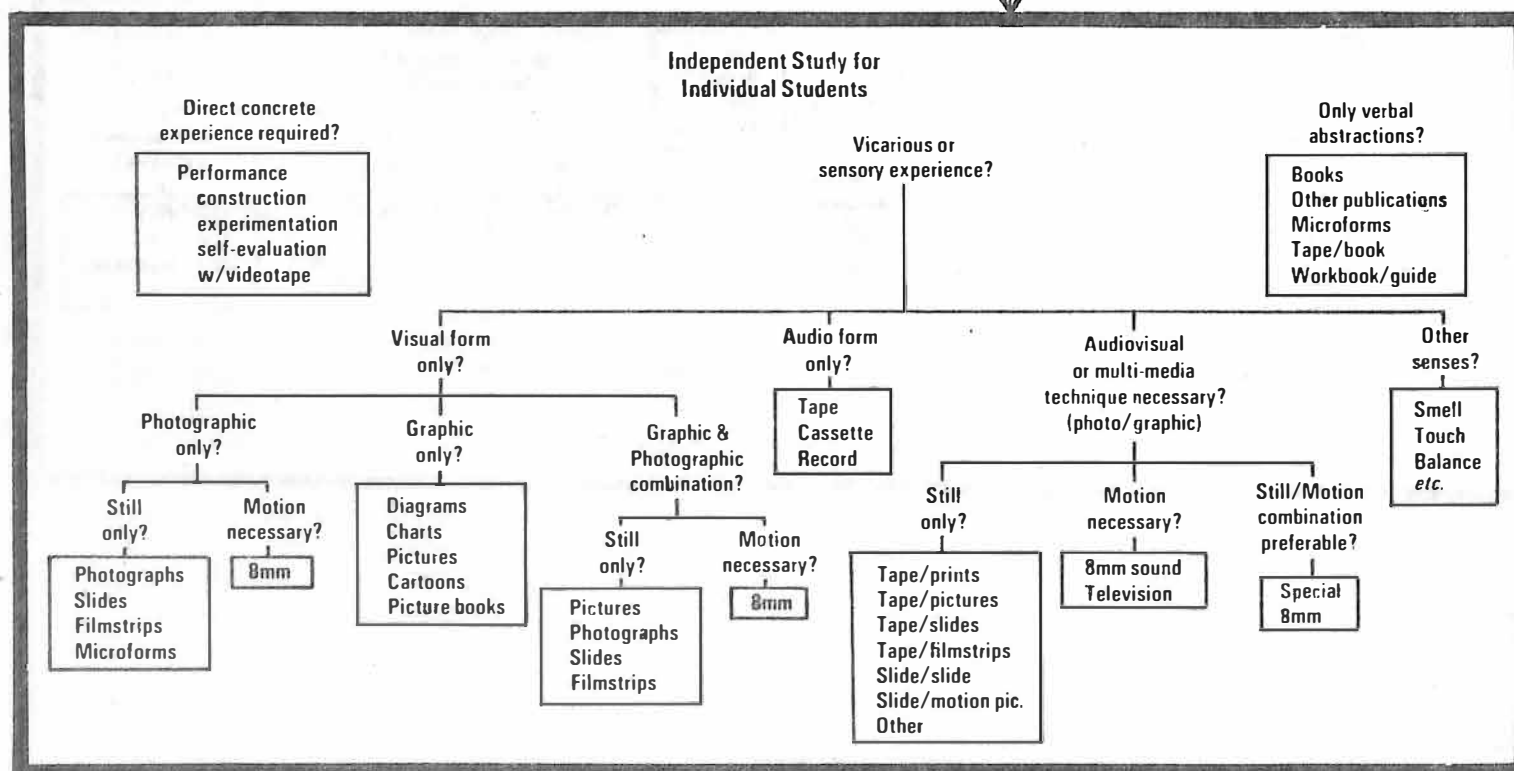
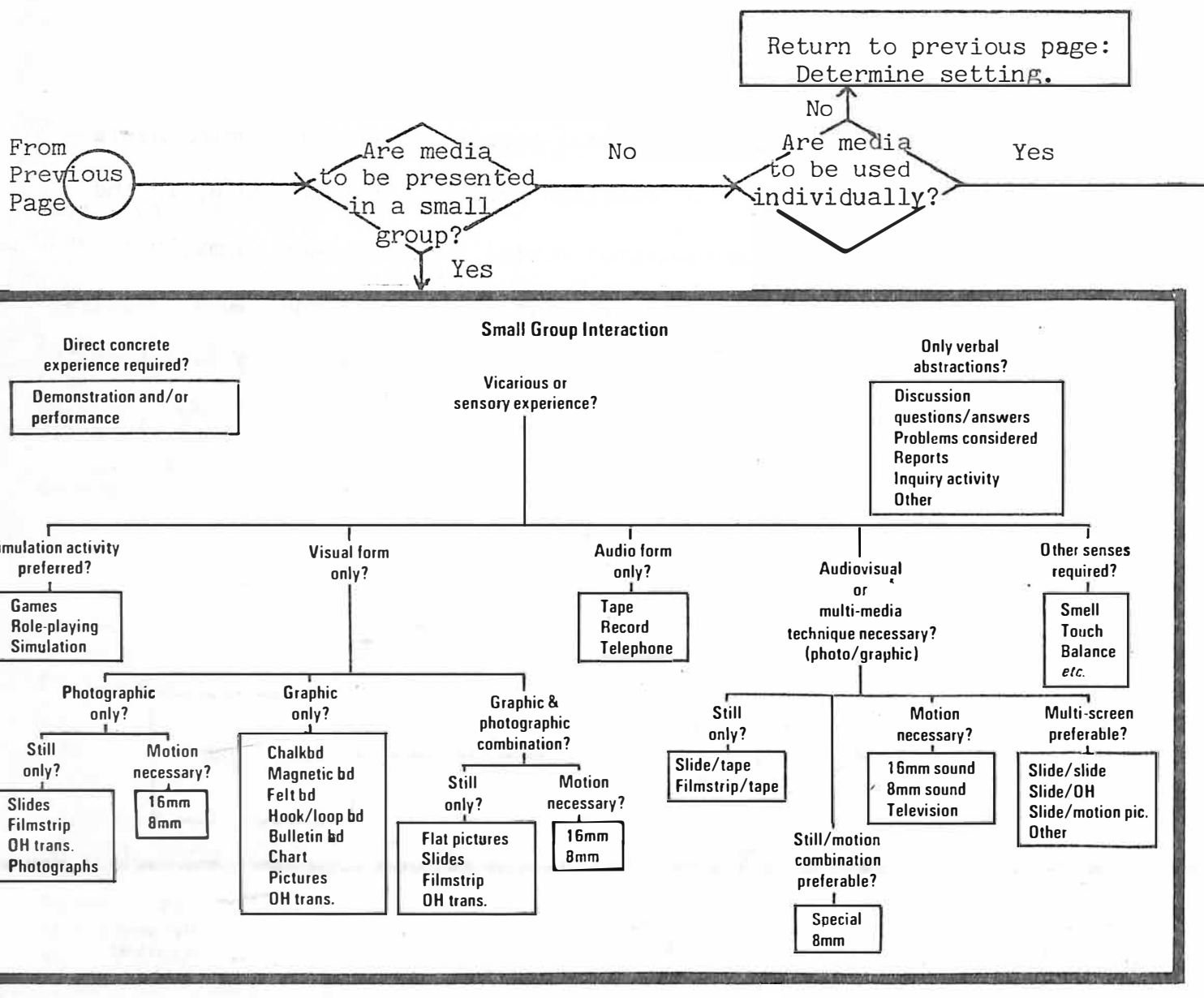
COST

Conformity to budget	Too costly for budget
No less expense for satisfactory substitutes	Satisfactory substitutes cheaper
Inexpensive or already purchased equipment	Expensive equipment needed
Economy if purchased	Greater expense to rent
Average supplemental costs for replacement, repair, physical processing, storage	Too expensive to replace, repair, process for use

## Instructional Setting

The instructional setting and normal teaching style with which media are going to be used affects the selection process. For instance, is the teacher using media as a presentational device to supplement normally expository instruction in groups, or will it be used for individual inquiry? The setting will affect the choice of media. Kemp developed a series of three decision charts for selecting media based upon the type of group (large group, small group, individual) to which it would be used. A flow chart is here provided to lead you to the appropriate chart:







## Practice

Following are 5 instructional objectives. For each, you have been provided with the age level of the learners and a teaching pattern. For each objective you are to determine the following:

- A. Whether or not you'd use any kind of media to teach people what they need to know in order to achieve the objective.
- B. The appropriate media format. Be prepared to provide a rationale/justification for your choice of format.
- C. Which piece of media (based on content of media and what you want media to accomplish) you would select. In order to do this, assume you've located (in a selection tool) 3 items in different media formats.

### Objectives:

1. Independent study, - - 3rd graders  
Be able to identify various kinds of flowers when on a class field trip to the woods.
2. Independent study, 300 students - - college  
Given photographs of structures with different architectural styles, be able to categorize them by style.
3. Group instruction - - college  
Rules of basketball. Given any game situation, the learner must be able to identify the rule infraction if any, describe the action required.
4. Individual instruction - - pre-schoolers  
When asked the question and provided with 2 stimulus items, the child must correctly respond to the question "Which is bigger?".
5. Independent study - - college  
Be able to list 5 ways to make a transparency for the overhead projector.
6. Small group instruction - - junior high  
Given any cassette tape recorder, the learner must record 3 minutes of his own voice and play it back so that it is audible and undistorted.
7. Independent study - - college  
Be able to correctly execute the overhead volleyball serve. A correct serve is one in which the ball is struck over the server's head with the front of a clenched fist and which does not touch the net as it goes in the opponent's court.

## PRACTICUM

After completing this unit, you are ready for the practicum exercise. When ready, consult the instructor, who will present you with a take-home exercise to be completed within one week. It will consist of four simulated instructional situations, including an instructional objective, description of the learners, setting, and a choice of three available media types. Your assignment will be to select one (and only one) of the media that will best fulfill all of the criteria stated in this unit and that contains the characteristics most appropriate for facilitating completion of the objective. You must state a rationale for choosing that medium in one page or less. The rationale should logically argue ~~that~~ the chosen medium possesses the most appropriate characteristics for fulfilling the objective with the given learners attempting to accomplish the specific task. Consider the objective. Analyze the kind of behavior required (Taxonomic Analysis), analyze the characteristics of the learner, and analyze the characteristics of the medium. When you achieve a match between all of these, you've probably chosen the correct medium. DON'T simply repeat advantages and disadvantages from this text. THINK. Argue logically (perhaps a few statements regarding why you didn't choose the other two would be appropriate).

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Group



